BOAT INFORMATION BOOK (BIB)

FOR

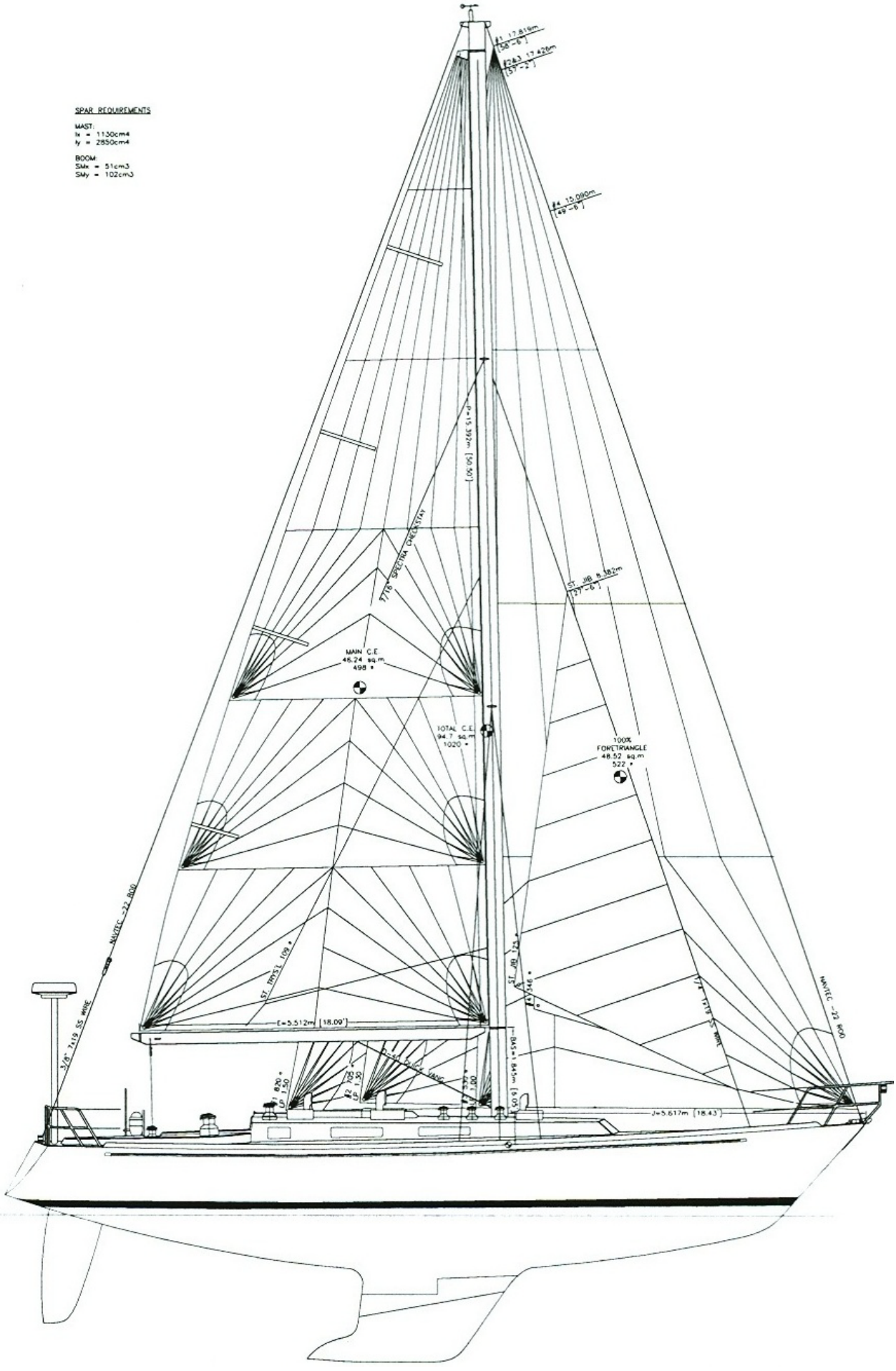
NAVY 44 MK II SAIL TRAINING CRAFT

AT

THE UNITED STATES NAVAL ACADEMY

FIRST EDITION
May 1, 2010

Revision 2
September 15, 2011


SPAR REQUIREMENTS
MAST:
Ix = 1130cm4
Iy = 2850cm4
BOOM:
SMx = 51cm3
SMy = 102cm3
#1 17.819m (58'-6")
#2&3 17.426m (57'-2")
#4 15.090m (49'-6")
5/16" DYNEEMA CHECK STAY
[60.90] =18.562m
ST. JIB 8.382m (27'-6")
MAIN C.E.
46.24 sq.m
498 #
TOTAL C.E.
94.7 sq.m
1020 #
100%
FORETRIANGLE
48.52 sq.m
522 #
NAVTEC -22 800
3/8" 7x19 SS wire
ST. TAPES 109 #
ST. JIB 125 #
E=5.512m (18.09')
ST. TAPES SS WIRE
NAVTEC -22 800
J=5.617m (18.43')

NAVY 44 MK II BIB
REVISION REQUEST FORM

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CHAPTER ONE
THE BOAT

1-1 INTRODUCTION

The Navy 44 Mark II Sail Training Craft (NA 44 MK II STC) is the latest of four generations of one-design offshore cruiser/racers to be authorized and funded by Congress for training midshipmen. The end of World War II brought the first fleet of 12 matched 44' wooden yawls designed by Naval Architect Bill Luders to the Naval Academy. After 25 years of hard service they were replaced by 12 fiberglass Luders 44' yawls, designed with the same exterior lines as the original boats, but with an interior that accommodated an auxiliary engine and navigation space with a chart table. After 25 years of offshore and Chesapeake Bay sailing, these boats were ready for replacement. The competition for the Navy 44 Mark I design was won by the firm of McCurdy & Rhodes, Inc. of Cold Spring Harbor, New York. The construction contract was awarded to Tillotson-Pearson, Inc. of Warren, Rhode Island. The first boat was delivered in 1987 and the 20th and last boat was delivered in 1991. The Mark I's were sailed for 20 years of near daily use.

The Navy 44 Mark II was designed by David Pedrick Designs with construction awarded to Pearson Composites, Inc of Warren, RI. The first hull (NA-21) was delivered in September 2007.

1-2 PRINCIPAL CHARACTERISTICS

Table 1-1 Specifications

Length, Overall	44.3 ft. 0 in. (13.51 meters)
Length, Waterline	36.75 ft. (11.2 meters)
Beam, Maximum	12.725 ft. (3.84 meters)
Draft	7.638 ft. (2.327 meters)
Mast Height, from Waterline	63.09 ft. (19.23 meters)
Displacement, Lightship trim	29,156 pounds
Ballast	10,472 pounds
Sail Area	1020 square feet mainsail and 100% jib
Engine, Diesel Auxiliary	Yanmar Model 4JH4E (NA 21-25) and 4JH4AE (NA 26-36), 50 H.P. @ 3000 RPM w/ Yanmar reverse reduction gear model KM4A, with Max Prop 483mm diameter, 356 mm pitch, feathering 2 blade prop.
Fuel Capacity	55 Gallons (50 useable)
Consumption (approx)	1 GPH @ 3000 RPM (maximum power) .75 GPH @ 2400 RPM (cruise power)
ELECTRICAL	12 volts D.C., 120 VAC, 30 Amp.
Alternators	Ship's Service/House alternator, Balmar 90-100 D 100 Amp Engine Start Battery alternator, Yanmar 60 Amp
Batteries	
Ship's Service/House Batteries	4 batteries in 1 SS bank; Lifeline AGM GPL-31T (420 total Amp hrs)
Engine Start Battery	1 - Lifeline AGM GPL-31T (105 Amp hrs)
COMMUNICATIONS	
VHF	ICOM IC-M 504 with ICOM Command Mic III
HF/SSB	ICOM IC-M802
ELECTRONIC EQUIPMENT	
Multifunction Display	Furuno NAVnet vx2 w/ SD slot for C-Map electronic charts
Sailing Instruments	Brooks & Gatehouse Hydra 3000
Radar	Furuno 1834C, incorporated in NAVnet
GPS	Furuno BPWGPS WAAS/GPS/Chart Plotter, incorporated in NAVnet
Weather Facsimile	D30, incorporated in NAVnet
AIS FA50	Furuno Automatic Identification System, incorporated in NAVnet.
Instrument interface	MiniPlex-41BT provides interface for up to four NMEA instruments, and has a laptop serial port access. Bluetooth capable for PDA or computer.
POTABLE WATER	175 Gallons in 3 tanks (35 gal day tank, 2-70 gal tanks under settee berths)
REFRIGERATION	Technautics Coastal 12 (12 VDC)
MSD HOLDING TANK	50 gal (PVC)
TANK TENDER SYSTEM	Hart Systems Model S 30-6

1-2.1 LOADING

The vessel should never be loaded above its maximum recommended load 34,755 lbs (15,765 kg) with a deadweight maximum of 5,600 lbs (2540 kg). This deadweight (weight above lightship including crew, stores, fuel, water, etc).is broken down as follows:

Crew	1,984 lbs	(900 kg)
Crew Effects	800 lbs	(363 kg)
Stores	661 lbs	(300 kg)
Fuel	384 lbs	(174 kg)
Water	1,413 lbs	(641 kg)
Sewage	357 lbs	(162 kg)

1-2.2 STABILITY INFORMATION

A maximum total load has been used for assessing stability and buoyancy comprising

- manufacturer's maximum recommended load 34,755 lbs (15,765 kg)
- fuel, fresh water, other fluids to maximum capacity of fixed tanks 2,154 lbs (977 kg)
- crew, stores and crew effects 3,446 lbs (1,563 kg)

This assessment has been made assuming that

- the boat in the light craft condition has a mass of 29,156 lbs (13,225 kg)
- all standard equipment is aboard.

1-2.3 MAST and DRAFT

The NA 44 Mk II STC has an overall height above the waterline of 19.23m (63.09 ft) and a draft of 7.638 ft (2.327 m)

WARNING*: DO NOT ATTEMPT TO PASS UNDER A BRIDGE OR OVERHEAD POWER LINES WITH LESS CLEARANCE THAN 65 FEET OR OPERATE THE US NAVY STC IN WATER DEPTHS OF LESS THAN 10'.*

1-2.4 HULL OPENINGS/FLOOD POINTS

The hatches, ports and seacocks that should remain closed at sea are at the discretion of the Skipper of the vessel.

The MK II is equipped with a small forward watertight collision bulkhead to lessen the likelihood of water intrusion in case of damage to the bow. **The watertight hatch, located in the forepeak, must remain closed except for inspections.**

1-2.5 HATCH IMMERSION ANGLES Down flood points and angle of down flooding in ascending order, calculated with Full Deck Model;

Flotation Condition:	**ISO MOC**
Foredeck Hatch	62.88°
Opening Side Port	88.48°
Companionway	110.64°

1-2.6 HULL CONFIGURATION & LAYOUT

The Mark II has a trimmed waterline length of 36.75 feet. A fixed hydrodynamic keel, flared at the bottom and containing 10,472 pounds of cast lead ballast, is arranged amidships. The rudder is a spade type. The Mark II has a continuous main deck around the raised cabin top and cockpit. Cockpit combing and cabin top are fitted with an array of winches, blocks, cleats and fittings sufficient for offshore training and racing. Deck surfaces are covered with Treadmaster non-skid. The main deck perimeter is fitted with fore and aft stainless steel pulpits, with stanchions that have double life lines port and starboard.

1-2.7 CONSTRUCTION INFORMATION

Basic layup of hull includes clear gelcoat and several layers of inner and outer skin of woven roving and biaxial glass matting with Detrakane resin over ATC Corecell. The hull is reinforced at the keel, mast, bow and chainplate areas.

The deck is laid up in a similar fashion as the hull, using a separate mold and joined to the top of the hull at the deck edges. Sufficient biaxial/matting reinforcing is overlapped to assure proper bonding at the joint

The bottom of the hull includes a stepped seat for bolting on the lead keel with ten (10) stainless steel bolts. The inner bottom of the hull (below cabin sole) incorporates a hollow fiberglass grid pattern of longitudinal and transverse members bonded to the inner skin which provides the necessary hull stiffness as well as support for the cabin sole.

1-3 HULL & EXTERIOR/INTERIOR ARRANGEMENTS

The NA 44 MK II is divided into three sections: deck, cockpit and cabin.

1-3.1 DECK - Supports the mast at the partners and is arranged with winches, cleats, stanchions, pulpits, lifelines, navigation lights, hatches, and fittings suitable for offshore sailing. See Figure 1-2 Hull and Deck Profile and Figure 1-5 Deck Layout and Cockpit.

1-3.1.1 MOORING, ANCHORING AND TOWING FITTINGS

There are two closed chocks amid ship and two closed chocks aft. There are two 8" cleats forward of the aft chocks. There are no forward chocks. Mooring lines attach directly to the bow mooring cleats.

In addition to dockside mooring, these fittings may be used for anchoring, towing, and being towed. Four (4) 45', 5/8-inch diameter, three strand twist nylon lines are stowed aboard for docking and mooring lines. See Chapter 6 for towing, mooring arrangements and anchoring.

There is a removable anchor roller that attaches to a stainless steel bracket welded on the port side of the bow pulpit.

1-3.1.2 PORTS AND HATCHES

The MK II has the following ports and hatches:

- Two fixed ports either side of the cabin trunk. Ports are through-bolted Lexan.
- Two Bomar opening ports on either side of cabin trunk aft of the fixed Lexan ports.
- One Bomar opening port in the starboard side of the cockpit to ventilate the quarter berth.
- One large custom deck sliding hatch on foredeck.
- Companionway slider is fiberglass with an acrylic drop washboard. Stowage for the washboard is provided in chocks in port wet locker aft of navigation station. A line and clip are provided so that the washboard can be secured to the boat while underway and is therefore immediately accessible in case of inversion.
- Bomar opening hatches are on the cabin trunk top, port/starboard forward of the mast, and one Bomar hatch is forward of the companionway slider.

1-3.1.3 DORADE VENTILATION

The STC deck is equipped with Dorade boxes for ventilation. The Dorade boxes have limber holes on deck and screw in cowls.

1-3.2 COCKPIT - A large well on the afterdeck accommodates the crew that will steer, and work the sails. See Figure 1-5 Deck Layout and Cockpit.

1-3.2.1 ANCHOR STOWAGE

There are two (2) anchors on board the Navy 44. One (1) 35-pound Hi-Tensile Danforth anchor is stowed vertically against the inside of the watertight bulkhead in the forepeak. Lashing chocks are provided for secure stowage. Six feet of 3/8-inch chain and 250 feet of 5/8-inch diameter 3-strand nylon anchor line is stowed with the anchor.

One (1) 20-pound Hi-Tensile Danforth anchor is stowed in the bottom of the port cockpit line locker with six feet of 3/8 inch chain and 250 feet of ½-inch 3-strand nylon anchor line.

1-3.3 CABIN - The cabin consists of habitable spaces, storage, electronics, and the auxiliary engine. Habitable spaces include berths, head/shower and galley. Water tanks are under the settee berths. Below the cabin sole is the mast step, water (day) tank, fuel tank, bilge pumps, engine start battery, and through-hull fittings. The engine compartment is below the companionway. See Figure 1-1 Bottom Grid,

Figure 1-3 Cabin and Figure 1-4 Cabin Interior.

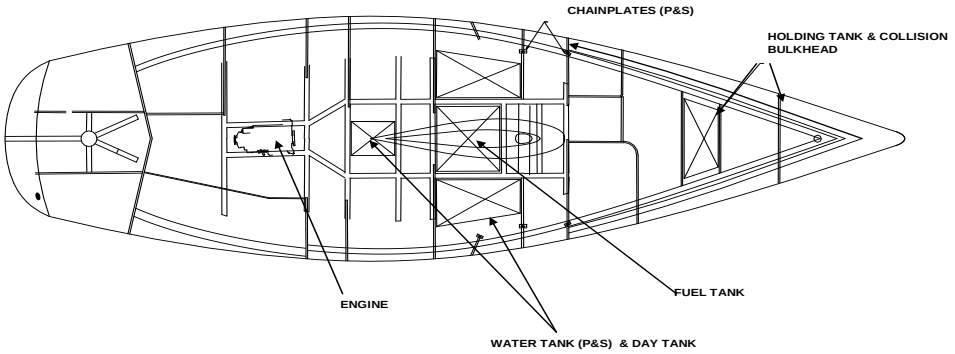


Figure 1-1 Bottom Grid

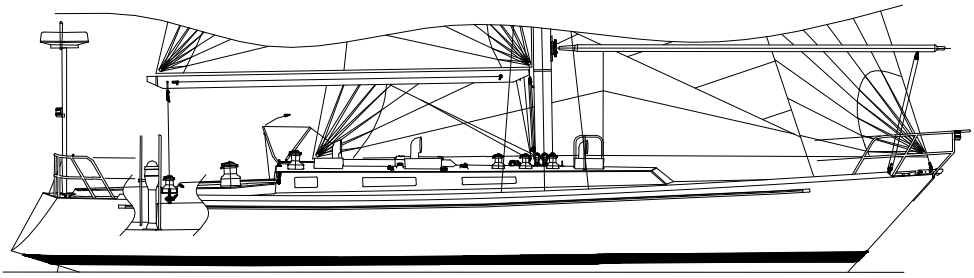


Figure 1-2 Hull and Deck Profile

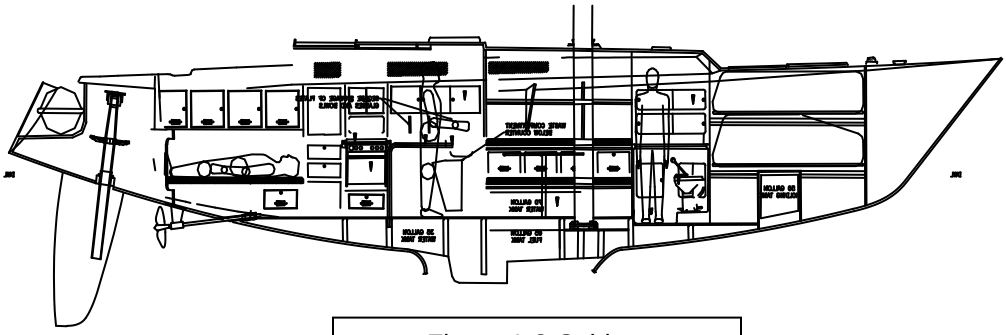


Figure 1-3 Cabin

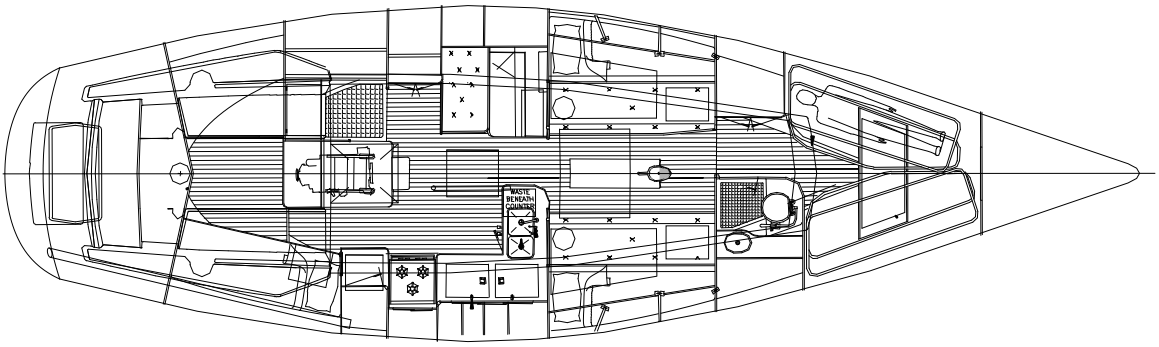


Figure 1-4 Cabin Interior

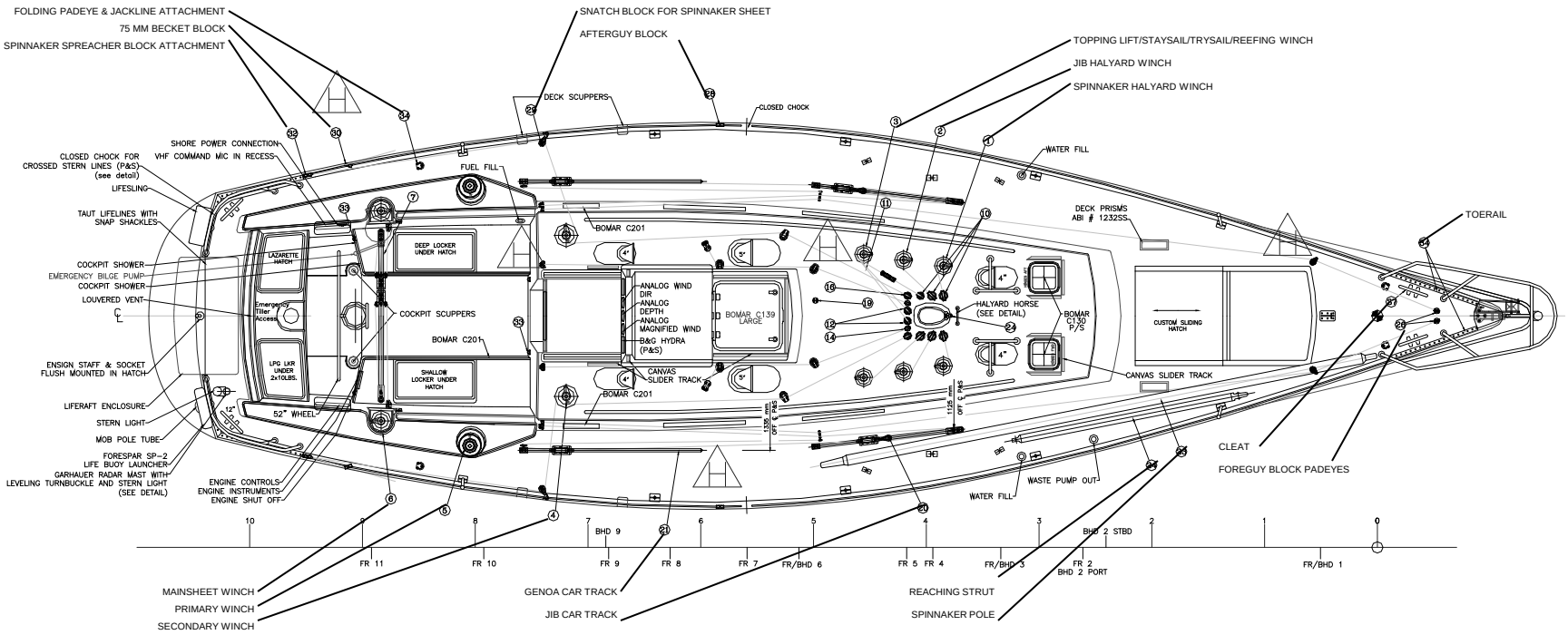


Figure 1-5 Deck and Cockpit

1-3.3.1 BERTHING

The Navy 44 is arranged with five (5) berths with mattresses in the main cabin as follows:

One (1) pilot berth and one (1) settee berth to Port.
One (1) pilot berth and one (1) settee berth to Starboard.
One (1) quarterberth aft of the galley on the starboard side.

Additionally four (4) hinged pipe berths are in the forward compartment, two to each side. Berth dimensions are approximately 76 inches by 25 inches. The berths in the main cabin have 4-inch foam cushions and are fitted with lee cloths and adjusting block and tackle to allow for heeling. The pipe berths have adjusting block and tackle and are usually used for sail storage.

1-3.3.2 GALLEY

The galley is located inside the cabin to starboard amidships and consists of a stove, refrigerator, sink and stowage compartments. The galley is fitted with Formica countertops, sea rails, and pantry locker with racks and shelves.

1-3.3.3 MESS TABLE

A Formica-topped mess table is available for mounting on centerline aft of the mast (between settee berths) and is fitted with hinged drop leaves, sea rails and lift-out panels for stowage. The table is normally removed to ease crew movement forward and aft and for sail storage when racing.

1-3.3.4 HEAD COMPARTMENT

The head is located forward and to starboard inside the cabin and consists of the marine head, sink, shower unit, mirror**,** and stowage shelves.

1-4 SPARS

The MK II is a masthead sloop rig whose spars include a single mast, a boom, a detachable spinnaker pole and a detachable reaching strut.

1-4.1 MAST

The mast is a section 6210 aluminum alloy tube from Chesapeake Rigging. The mast is finished with Awlgrip paint. It has an external mainsail Antal track with matching cars on the mainsail luff. The headboard attaches to a separate double Antal car. The double headboard car stays on the track through the use of the track “stopper” when removing the mainsail.

With the exception of the spinnaker halyard external sheaves, the masthead has internal halyard sheaves welded to the mast top.

Aluminum spreader bars with airfoil sections and through-mast mounting are fitted at about the middle and the top quarter of the mast.

A separate track is located on the port side of the mainsail track for the storm trysail. A 12 foot spinnaker pole track with single toggle car is fitted on the forward side of the mast. A conduit inside the mast houses wiring for navigation lights, deck light, anchor light, Windex light, wind instruments and antennas; these wires exit at the base of the mast. The mast goes through the deck, is fitted with a mast collar, wedges and a boot for watertight integrity. The mast steps on an adjustable plate that is mounted to an alloy mast step bolted to the structural grid.

WARNING: ***Controlling height of the mast for bridge clearance is 65 ft, passing through the center span of the bridge, due to the electronic wind sensor and VHF antenna at the masthead.***

1-4.2 MAIN BOOM

The main boom is an aluminum extrusion (6061-T6) manufactured by Chesapeake Rigging and is finished with Awlgrip paint. Two reefing sheaves are internally mounted on the aft end with another two internal sheaves on the gooseneck end. Two rope clutch reef locks at the forward end secure the reef line when it is set to free the reefing line winch for other evolutions. The boom is fastened to the mast with a gooseneck approximately five (5) feet above the cabin top and is fitted with a Hall Spars Quik Boom Vang size D40. The control lines can be led back to the cam cleats both sides of the companionway or through the swivel cam cleats for trimming either from the cockpit or the weather rail.

Figure 1-6 Standing Rigging

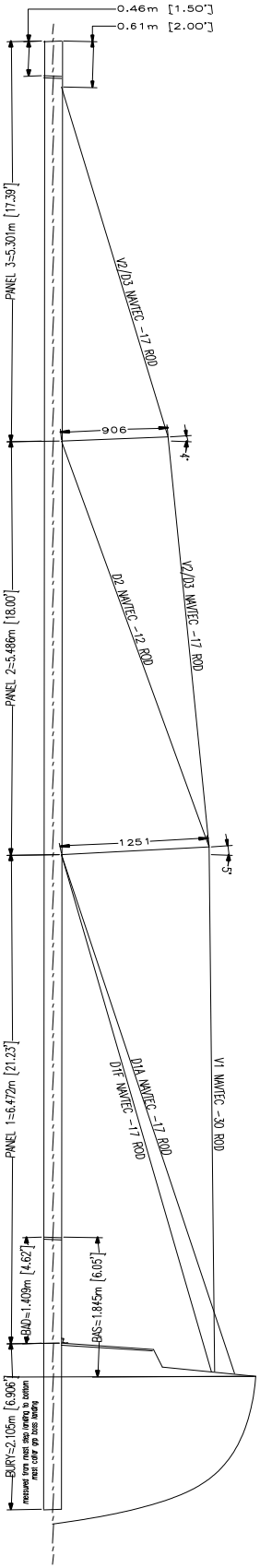
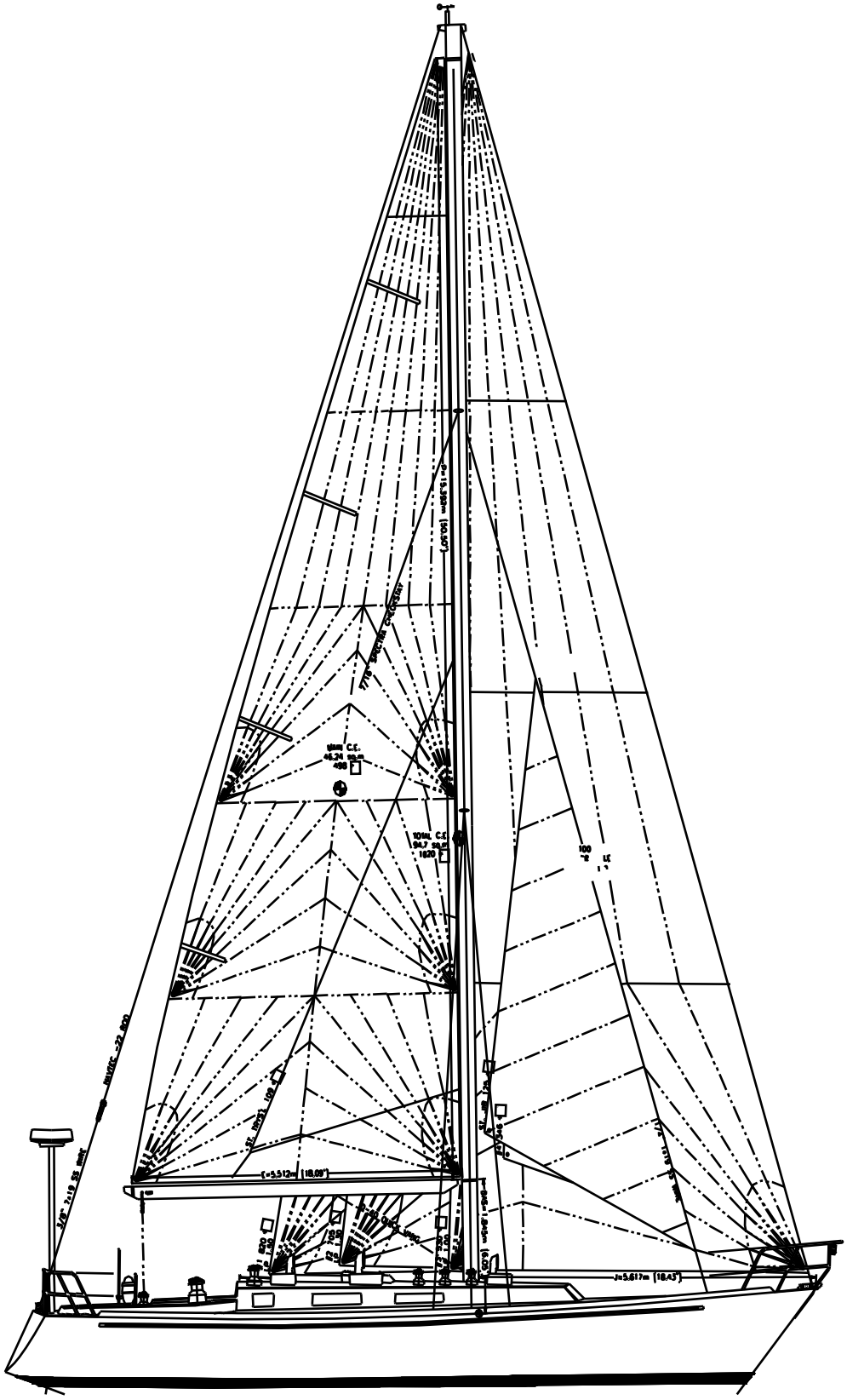


Figure 1-7 Sail Plan



1-4.3 SPINNAKER POLE

The spinnaker pole is a 4-inch diameter aluminum alloy tubing 18 feet, 4 inches long, manufactured by Chesapeake Rigging. The inboard end is equipped with a socket that attaches to a fitting on the spinnaker track car. The outboard end of the pole has a fitting to accept the spinnaker afterguy. When not in use, the spinnaker pole is stowed in starboard deck chocks on the foredeck.

1-4.4 REACHING STRUT

The reaching strut is a 7 foot, 3-inch, aluminum alloy tubing, manufactured by Chesapeake Rigging. It is equipped with an inboard socket fitting that attaches to a fitting mounted on the outboard side of the mast approximately two (2) feet above the cabin top. The outboard end has a fitting to accept the spinnaker afterguy to route it outboard of the stanchions. The reaching strut must be rigged before easing the pole to the headstay to prevent the afterguy from bending the stanchions.

The reaching strut is used with the spinnaker when the apparent wind angle is forward of the beam. This reduces chafe on the afterguy, and increases the mechanical advantage of the load on the afterguy to help keep the spinnaker pole from touching the headstay when close reaching, especially in a seaway.

1-4.5 STANDING RIGGING

The mast is held vertical by a combination of stays and shrouds which collectively make up the standing rigging. It consists of a permanent rod headstay attached from the stem chainplate to the masthead, a rod rigging backstay that is split at deck level and rod rigging shrouds. See Figure 1-6 Standing Rigging.

1-4.5.1 SHROUDS

An upper shroud attached with a fixed terminal fitting fastened to the masthead passes through the outboard end of the upper spreaders and attaches to the outboard end of the lower spreader.

The lower vertical shroud attaches to the outboard end of the lower spreader and leads to a chainplate on the deck. This lower vertical shroud also supports the load on the upper diagonal shroud. The forward lower shroud attaches to the mast below the lower spreader with a fixed terminal fitting and leads to a chainplate on the deck approximately two feet forward of the vertical shroud.

The aft lower shroud attaches to the mast below the lower spreader with a fixed terminal fitting. The lower aft shroud leads to a chainplate on the deck approximately two feet aft of the vertical shroud. Each lower shroud and upper diagonal shroud is fitted with a turnbuckle to adjust tension when tuning the mast. See Figure 1-8 Typical Turnbuckle.

Tuning is the process by which the standing rigging is adjusted so that the mast remains in column, directly on centerline when exposed to typical operating loads. The mast is tuned by Small Craft Repair Department or VOST support personnel and is not to be tuned by MK II skipper or crew unless supervised by the former. See Table 1-2 Standing Rigging.

Table 1-2 Standing Rigging

ITEM	SIZE	MATERIAL	QUANTITY.
Upper Shrouds - V2/D3	-17	NAVTEC 22-13-5	2
Vertical Shrouds – V1	-30	NAVTEC 22-13-5	2
Middle Shrouds – D2	-12	NAVTEC 22-13-5	2
Lower Shrouds – D1A/D1F	-17	NAVTEC 22-13-5	4
Forestay	-22	NAVTEC 22-13-5	1
Backstay	-22 rod with 3/8 wire below insulator	NAVTEC 22-13-5	1
Inner Forestay (Collapsible)	1/4" Dia	1x19 Stainless Steel Wire	1
Running Backstay (Collapsible)	7/16" Dia	T-900 Sta-Set or equivalent.	2

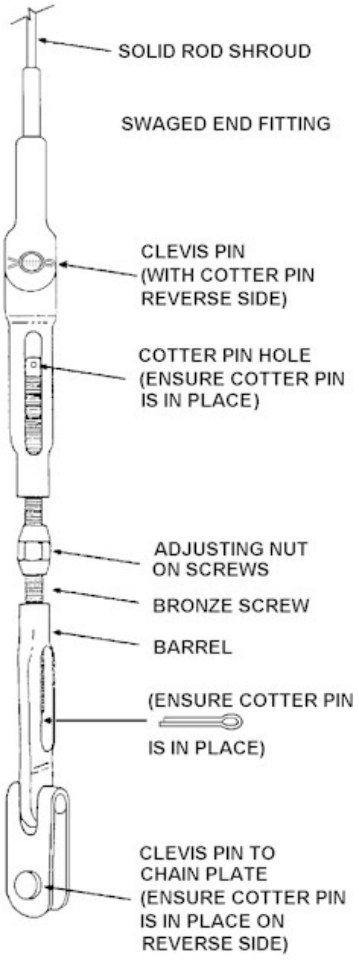


Figure 1-8 Typical Turnbuckle

Figure 1-9 Backstay Tensioner

NOTE: ***Always ensure cotter pins are installed and the ends are separated so they don't fall out at the beginning of each block or prior to embarking on an offshore voyage.***

1-4.5.2 SPREADERS

The MK II mast has two sets of aluminum spreaders which extend with a four degree dihedral angle from the mast at approximately 21 feet and 39 feet above the deck for the lower and upper sets respectively, thus the rig is referred to as a "double spreader rig". The spreaders assist the shrouds in keeping the mast in column. See Figure 1-6 Standing Rigging.

1-4.5.3 NAVTEC HYDRAULIC BACKSTAY TENSIONING DEVICE

The backstay tensioner is used to control headstay sag and to bend the mast in order to shape the mainsail. Use the backstay tensioner to pull the head of the mast aft as the wind increases. The forestay will tighten to reduce forestay sag, which will give the headsail better entry. The opposite force exerted at the mast is seen as a bending of the mid section of the mast forward. This will help to flatten the mid section of and control the draft in the mainsail.

The tensioner has a gauge that gives load on the system in thousands of pounds. The gauge is located at the top of the cylinder.

- To increase the load on the system turn the load release valve (bleed valve) clockwise until finger tight. The valve is located on the lower part of the cylinder on the side opposite to the pressure gauge. Use the hand pump to increase pressure to the desired load.

- To release the load turn the bleed valve counterclockwise approximately 1/4 turn. Close the bleed valve when the desired load is attained. Minimum pressure for a static system at rest is 500 pounds. **Maximum pressure is 1700 pounds.** See Figure 1-9 Backstay Tensioner.

1-4.5.4 COLLAPSIBLE INNER FORESTAY

A collapsible inner forestay, of 1/4"- 1X19 stainless steel wire, is attached to the front of the mast with an aluminum welded tang at a point 18 feet, 9 inches below the masthead. The lower end of the inner forestay is attached to the deck with a shackle and is adjusted with a folding handle attached to a threaded fitting.

When deployed, the inner forestay will lessen the flexing of the mast due to strong winds and seas. It also serves as the stay to which the genoa staysail and the storm jib is attached. When not in use the lower end can be led through the fairlead on the port side of the base of the mast, and attached to the block and tackle and small stainless steel O-ring at the padeye on the cabin top aft of the mast.

The running backstays are attached to the back of the mast at the same height as the inner forestay and must be used when the inner forestay is set.

1-5. RUNNING RIGGING AND HARDWARE

Running rigging is the equipment and lines used to hoist and trim the sails. It includes running backstays; halyards to raise and lower sails; sheets for headsails; spinnaker sheets and after guys, spinnaker pole topping lift and foreguy (down haul); main sheet, traveler, cunningham, vang, outhaul and reefing lines for the mainsail. Hardware includes (but is not limited to) snatch blocks, spreecher blocks, rope clutches, winches and winch handles.

1-5.1 RUNNING BACKSTAYS

There are two running backstays, or checkstays, one on each side, attached to the sides of the mast at the same height as the collapsible inner forestay. They provide stability to the mid-mast region when the inner forestay is used for setting the storm jib or genoa staysail and help to keep the mast from pumping in a rough seaway. The stays can also be used as checkstays to straighten the mast for optimum sail trim while racing. The windward running backstay must be set when the genoa staysail is used. Both running backstays may be set when the storm jib is used. They are stowed against the after lower diagonal shroud turnbuckles and tied off with shock chord.

1-5.2 HALYARDS

The masthead is fitted with five (5) aluminum sheaves on which the halyards turn; one for the mainsail, one for the port jib/genoa, one for the starboard jib/genoa, and two spinnaker sheaves. The halyards all are rigged to travel internally through the mast to deck level.

- The two spinnaker halyards pass through external blocks attached to welded cranes on each side of the forward face of the masthead. At the base of the mast, they are led through turning blocks to the forward port and starboard winches on the cabin top.
- The two jib/genoa halyards are led through turning blocks to the middle port and starboard winches on the cabin top.
- The main halyard is led through a turning block at the base of the mast to the aft winch on the starboard side of the cabin top.
- A topping lift/staysail halyard is used to control the vertical position of the outboard end of the spinnaker pole and as a halyard for a staysail and storm jib. It is led to a sheave located on the front of the mast just below the inner forestay attachment and descends inside the mast, exiting on the lower port side to a deck-mounted swivel turning block. The line is led through a rope clutch, then to the aft port side winch.

The main halyard is equipped with a captive pin shackle. The jib/genoa and spinnaker halyard shackles are trigger type snap shackles. The topping lift is fitted with a swivel snap shackle.

Note: The mainsail, jib/genoa halyards are 1/2" T-900 or equivalent, 140'. The topping lift/staysail halyard is 7/16" Endura Braid or equivalent, 110'. The spinnaker halyards are 7/16" Sta-Set or equivalent, 140'.

1-5.3 SHEETS AND GUYS

A sheet is a line that controls the clew of a sail. A guy is a line that is led to the spinnaker pole outboard jaw end to control the spinnaker and pole to windward. The spinnaker guy, typically called the after guy, is a low stretch spectra line. It includes a snap shackle attached to the sheet. A "donut" stopper is fitted to prevent chafe and keep the snap shackle from fouling in the spinnaker pole jaw. The foreguy is rigged along both sides of the deck and attaches to the bottom of the outboard end of the spinnaker pole to exert downward pressure and stabilize the pole.

1-5.4 MAINSHEET

The mainsheet is double ended with sheet tension controlled by two self-tailing winches mounted on the cockpit coaming for trimming from either rail. The mainsheet runs through a block on the end of the boom to a block mounted on each end of the traveler car and then to a winch. Since the mainsheet runs through a block on the end of the boom, each end of the mainsheet has a 2:1 mechanical advantage in addition to the winch power.

Figure 1-10 Mainsheet System; Traveler, Winch and Cleat

1-5.5 MAINSHEET TRAVELER

A traveler (consisting of two Harken cars mounted end to end) is fitted to a track in the cockpit in front of the helm. The car is controlled by a continuous tag line, dead-end spliced to the double fiddle blocks at the ends of the traveler track. It exits through a block and a bulls-eye fairlead at the end of the traveler, and leads to a cam cleat on the cockpit wall forward of each mainsheet winch. This control is used to adjust the mainsail's angle of attack to the wind. When sailing close-hauled the traveler is pulled up to center the boom. It is let down to leeward in strong wind to reduce heeling and decrease weather helm.

1-5.6 OUTHAUL

The outhaul is a line led through the boom, through a block at the end of the boom and attaches to the aft end of a car on the boom. The clew of the mainsail is attached to the forward end of the car. It can be pulled aft to flatten the sail in stonger winds, or be eased forward to increase the amount of draft. The outhaul control line exits to a cam cleat on the bottom of the boom between the vang and gooseneck. See Figure 3-6

1-5.7 CUNNINGHAM

The cunningham is a light duty block and tackle used to tension the luff of a fully hoisted mainsail. It is primarily used to keep the maximum draft of the mainsail forward as the wind increases. To relocate the draft to the proper position, to about the forward 1/3rd of the chord of the sail, increase tension on the cunningham.

1-5.8 BOOM VANG

The boom vang (vang) controls the main boom's vertical rise and twist of the mainsail on reaches and runs when the sheet is not pulling the boom down. The vang is usually set so the boom is parallel to the deck (check the top batten is parallel to boom as a guide to correct tension). The vang also supports the boom when the mainsail is not hoisted.

1-5.9 PREVENTER SYSTEM

A preventer system has been installed on the MK II to help prevent accidental gybes when the wind is at 120 degrees or greater off the bow.

On each side of the boom, a red preventer line is installed. When not in use, a snap shackle on the forward end of the line attaches to a padeye on the boom near the gooseneck. When in use, the line is led outboard of shrouds and stanchions, and attached by the snap shackle to a pennant led to one of the bow mooring cleats. The other end enters the boom through an internal sheave near the aft end of the boom and crosses in the boom to an internal sheave on the opposite side of the boom near the goose neck. It then passes to a turning block at deck level and to the cabin top winch. The advantage of this arrangement is that the preventer can be adjusted from the weather rail and the boom gybed without detaching either preventer. During the gybe, the leeward preventer line is eased as the boom gybes. The other preventer line is then taken in to prevent an accidental gybe. The lines are permanently mounted on the boom so they can be deployed quickly. See Figure 1-11.

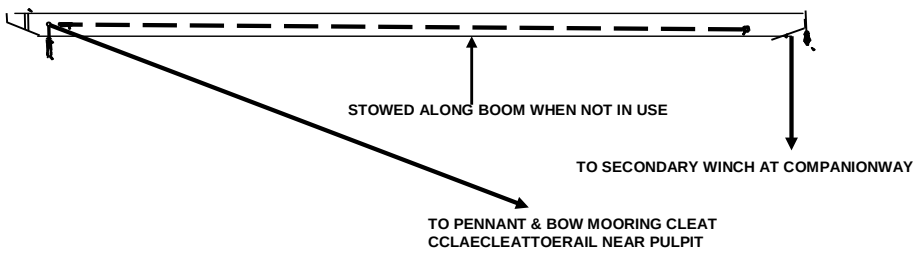


Figure 1-11 Preventer Deployed

1-5.10 REEFING LINES

The MK II is equipped with a double reefing system led internally in the boom. The first reefing line leads from a deck mounted swivel block at the base of the mast, up to a sheave in the forward end of the boom, into the boom through a rope clutch, exiting to a sheave at the aft end of the boom then up through the first reef cringle and tied back onto the boom. The second reefing line has the same run pattern but is rigged on the other side inside the boom. When not in use the reefing lines are secured at the aft end of the boom with a figure eight knot in each to keep it from running out through the sheave. See Chapter 3.

1-5.11 ROPE CLUTCHES

There is one Spinlock clutch port side, aft of mast for the staysail/topping lift halyard, and two reefing line clutches inside the bottom of the boom at the forward end. These are used to lock off the line, which enables the crew to free up a winch to use for a working line.

1-5.12 WINCHES

The vessel has twelve different winches for controlling running rigging. These are listed in Table 1-3.

Table 1-3 Winches

Qty	Description	Manufacturer	Part Number
2	48 ST-SS Spinnaker Halyard winch	Lewmar	49048057
2	48 ST-SS Jib Halyard winch	Lewmar	49048057
2	48 ST-SS Reefing/Main Halyard winch (starboard) and Spinnaker Pole Toppng Lift (port)	Lewmar	49048057
2	64 ST-SS Secondary winch	Lewmar	49064004
2	77 ST-SS Primary winch	Lewmar	49077004
2	54 ST-SS Mainsheet winch	Lewmar	49054004

Winch handles are used to control the rotation of the winches. All the handles on the NAVY 44 are “locking" type. A small spring loaded lever on the handle head engages and disengages the lock device. There are single handed handles, (short hand grip), and double handed handles, (long handgrip).
Deploy winch handles to the winch handle pockets in following locations: The combination sheet bags/winch handle holders on the forward face of the cockpit for cabin top winches and for the primary winches (double handles for primaries). Mainsheet winch handle holders are mounted just below the traveler track on the inboard side of the cockpit seats. Winch handles for the halyard winches are stowed in the dorade cowls.

1-5.13 SNATCH BLOCKS

Snatch blocks provide a lead block where needed. Typical locations are on the toe rail:

- Four holes forward of the midship closed chock, as a lead block for spinnaker guys.
- At the midship life line stanchion for outboard jib lead, staysail, and genoa sheet reaching leads.
- As a lead block for the spinnaker to keep the spinnaker sheet from rubbing on the boom.
- As a lead block for the running backstays.

1-5.14 SPREACHER BLOCKS

Spreacher blocks are double blocks attached to the toe rail tang below the lower rail of the stern pulpit. They are used as turning blocks for the spinnaker sheets, and for leading other lines such as the storm trysail sheet, or a changing spinnaker sheet.

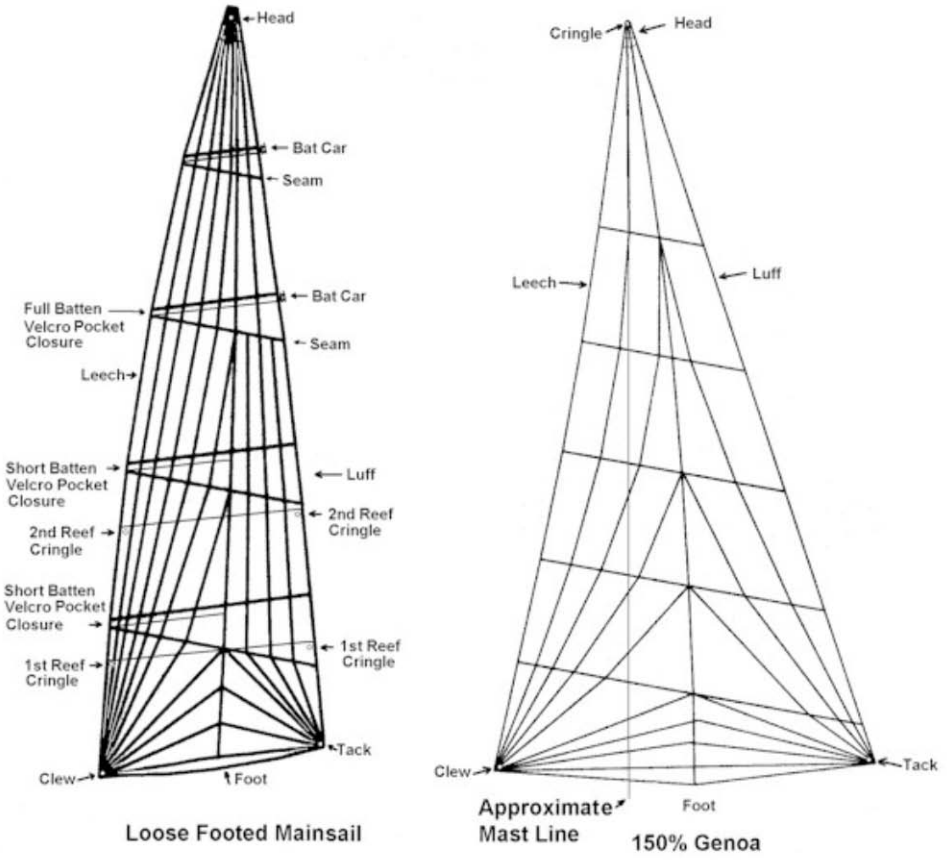


Figure 1-12 Mainsail and Genoa Nomenclature

1-6 SAILS

Mainsail
Storm trysail
No. 1 Head sail 150 %
No. 3 Head sail 100 %
No. 4 Head sail 85 %
Storm jib
Stay sail
Tri-radial spinnaker
No. 2 Head sail (high-clewed Jibtop) Optional

1-6.1 MAINSAIL

The mainsail is made of 9 oz Dacron material with a total sail area of 498 square feet. The first reef can reduce sail area to 350 square feet (70%) and the second reef to 270 square feet (54%).

The mainsail is not an exact triangle. The mainsail is constructed of multiple panels in a tri-radial pattern so that it forms an airfoil. The curve of the airfoil is the camber of the sail. When air flows across it, lift is created. Lift is the aerodynamic principal that makes it possible for the sail to propel the boat, even in a vector toward the wind. This is a key concept in sailing. The extra material along the trailing edge (leech) of the sail that extends beyond a straight line between the head and clew of the sail is called "roach" and serves to slightly increase the sail area.

The mainsail has four battens to support the roach of the sail. The top batten is a full-length batten that extends from luff to leech, supports the roach, and gives the draft definition. A batten car supports the luff end of the batten. The three lower battens support only the aft portion of the sail. The edges of the sail are seamed with extra layers of material (called tabling) to prevent chafe. The aft ends of the batten pocket have a Velcro closure to retain the batten. The sail is loose footed, and is attached to the boom

only at the tack and clew.

Once the mainsail has been installed, or “bent on,” it is normally left attached to the mast and flaked on the boom. It is secured with sail ties, and covered with an acrylic sail cover to prevent ultra violet light deterioration. The three corners of the sail (head, tack and clew) are reinforced with extra fabric to withstand strain. The mainsail is fitted with a cringle to attach the cunningham to help control draft position and luff tension and reef cringles. Additional cringles are fitted along the luff and leech for the first and second reef points.

See Figure 1-7 for Sail Plan, Figure 1-12 for Mainsail and Genoa Nomenclature.

1-6.2 JIBS/GENOAS

A genoa is a headsail that fills the foretriangle (area forward of the mast), overlaps the mast and extends aft past part of the mainsail. A jib is a smaller headsail that fills only the foretriangle or any part of it.

The MK II is usually provided with three (3) Dacron genoa headsails. The #1 (150 percent) genoa is the largest headsail and is made of cloth weighing 6.3 oz. per square yard. The genoa sheets are led outboard of the shrouds to the genoa car lead blocks on the aft headsail tracks then to the primary winches when sailing to windward, or outboard of all shrouds to snatch blocks on the toerail then to the primary winches when reaching. The optional jibtop genoa is designed with a high clew to allow for better visibility of the forward leeward bow area and to open the slot between the mainsail and the jib top for more efficient aerodynamic flow when reaching.

A #3 (100 percent) jib and the #4 (85 percent) jib are also provided. The #4 jib has a pennant attached to the head so the sail does not run to the full hoist of the headstay. For beating or close reaching, the jib sheets for both the # 3 and #4 jibs are led outside of the forward lower shrouds and inboard of both the upper shrouds and the aft lower shrouds to the forward jib car lead bocks on the forward headsail track.

Jibs/genoas are attached to the rod headstay either with #3 piston hanks or, for racing, with luff tape and a luff rope sewn on the sail that fits in a twin-grooved headfoil headstay. The piston hanked headsails are pull-pin type that is hooked directly to the forestay.

A control line is used to move both the genoa and jib cars fore and aft. The line is attached to the forward end of the jib car, forward to a turning block, then aft to a cam cleat mounted on the outboard side of the cabin near the cockpit. The jib and genoa cars are adjusted simultaneously and can be used to control the sail’s shape along with the halyard and backstay adjustments.

See Table 3-1 Sail Management, for sail selection for a given wind condition, and recommended starting sheet lead positions.

1-6.3 SPINNAKER

The spinnaker is used for sailing "off the wind" e.g. beam or broad reaching or running. Spinnakers are made of nylon cloth of a weight to match the wind condition. The standard spinnaker for the MK II is 1.0 oz cloth although racing boats may have other spinnakers to match conditions.

1-6.4 STORM SAILS

Storm sails are provided on the Navy 44, a storm jib and a storm trysail. These are small sails, made of heavy Dacron, reinforced to withstand high winds, and are orange in color for visibility. The storm jib is hanked to the collapsible inner forestay and has a pennant attached to the tack to raise the foot of the sail above the deck to avoid seas breaking over the foredeck. The sheets are lead outside the life lines to a snatch block on the toe rail, one (1) hole aft of the midship lifeline stanchion, or through the jib car depending on the point of sail.

The running backstays must be used with the storm jib. Both running backstays may be rigged at the same time as long as they don’t interfere with the mainsail or storm trysail. If they do, only the windward running backstay shall be tensioned.

The storm trysail is used in lieu of the mainsail in severe weather, and is hoisted on its own track on the port aft side of the mast next to the mainsail track. The tack of the sail has a pennant line spliced through the tack cringle. This pennant must be attached to the padeye on the mast below the trysail track prior to

hoisting, and is pre-set to allow the sail to be hoisted above the boom and secured with the tack above the head of the mainsail. The permanently attached sheets lead to spreecher blocks attached to the toe rail aft. Both sheets are set at the same time to make the storm trysail self tending. See Chapter 6.

1-7 SYSTEMS

1-7.1 STEERING SYSTEM

The steering system consists of an anodized Edson quadrant attached to the rudder stock. The quadrant is fixed around the rectangular stock section with clamping pressure and a set screw bolt. Stainless steel wire rope (3/16" 1x19) is reeved around the quadrant then to sheaves that lead up into the Edson pedestal. The wire ropes are connected to the roller chain coming down within the pedestal from the sprocket that drives the wheel.

The steering system on the vessel consists of:

- Edson 402 ST-6-211 pedestal with wheel dampener. (NOTE: Dampener is not a brake and should not be used as a brake while sailing. DO NOT OVERTIGHTEN).
- Edson steering wheel with leather covered rim, 48-inch diameter.
- Edson 802-10 aluminum alloy radial drive (with centerline markings) attached to the rudder stock.
- 6.4mm 7 x 19 stainless steel wire rope cables from pedestal to drive.
- Stainless steel roller chain within pedestal (15.9mm pitch non magnetic stainless).
- Steering stops are installed to limit rudder angle either side of centerline.

1-7.1.1 RUDDER

The rudder is a composite FRP/epoxy molded unit with an integral carbon rudder stock. The rudder has an elliptical profile with low drag. The rudder is a balanced spade type rudder. The rudder is supported by two roller bearings. One is at the hull – the other at the deck. Both bearings are by PYI-Jefa. The lower roller bearing creates the watertight seal at the hull with an integral seal in the roller bearing. The rudder stock has a stainless steel fitting (receptacle) that is bonded onto the top of the post on deck. The receptacle has a machined female recess with flat sides.

1-7.1.2 EMERGENCY TILLER

An emergency tiller is provided with the MK II. It is stowed in the port cockpit locker. In the event of main steering system failure – open the inspection port on the aft cockpit seat using a winch handle, and fit the tiller into the receptacle on top of the rudder stock. The tiller arm extends out to the side, so it is not necessary to remove the wheel to steer.

The emergency tiller has a yoke that ends in a machined stainless steel tiller head that matches the shape of the receptacle on the top of the rudder stock. A stainless steel bolt connects the tiller head to the socket on the rudder stock with a wing nut to restrain the tiller from becoming detached from the socket. The tiller is stowed in the port cockpit locker when not in use.

Figure 1-13 Emergency Tiller Setup

1-7.2 PROPULSION

The MK II is equipped with a Yanmar diesel auxiliary engine. The engine is a Yanmar 4-cylinder, vertical, water cooled engine. The engine in STC NA 21-25 is a model 4JH4E rated at 41kw (55hp) at 3000 rpm. The engine in NA 26-44 is model 4JH4AE rated at 40kw (54hp) at 3000 rpm. The engine is naturally aspirated (there is no turbocharger). The engine drives a two-bladed Max-Prop feathering propeller via a Yanmar Marine reverse reduction gear (KM4A1) (2.63:1 ratio) and standard prop shaft that is supported by a strut attached to the bottom of the hull.

1-7.2.1 ALARMS

The Yanmar engine instrument panel is located in the cockpit at the aft end of the port cockpit locker. It has the following visual indicators and audible alarms:

Visual Indicators

- Engine RPM (Tachometer)
- Hour meter
- Engine coolant temperature (light on gauge for high temperature)
- Engine oil pressure (light on gauge for low oil pressure)

Audible Alarms

- Engine coolant high temperature
- Engine oil low pressure

The Sea-Fire Fire Extinguisher System located inside the engine box has a discharge alarm unit mounted in the navigation station, below the AC distribution panel. It will provide visual and audible warning of system discharge.
NOTE: When the alarm activates, shut down engine, electrical systems and engine blower immediately.

Figure 1-14 Sea Fire Discharge Alarm

1-7.2.2 COOLING SYSTEM

The Yanmar engine is cooled by a seawater/jacket water heat exchanger. The engine has an antifreeze/fresh water coolant mixture in it like an automobile engine. This is passed through a fin/tube heat exchanger. Seawater is passed through the heat exchanger in the opposite direction. The seawater takes the heat out of the engine coolant. The seawater is then discharged through the wet exhaust system. Normal operating temperature is between 160-190 degrees F.

1-7.2.3 LUBRICATION

The Yanmar engine is a 4-cylinder diesel engine. It has an oil pan like an automobile engine. The oil level should be checked before every use of the engine.

WARNING: ***The engine should not be operated when the boat is heeling more than 20^{o}. An inclinometer is installed on board on the cabin overhead aft of the mast.***

1-7.2.4 POWERED VENTILATION

The engine compartment is served by a Rule exhaust blower. The exhaust blower is plumbed to air vents on the transom. The blower has a separate circuit breaker on the DC distribution panel and must be operated whenever the engine is running and for 15 minutes after engine shutdown to prevent overheating the engine compartment and in turn activating the fire extinguisher.

A second Rule exhaust blower is located in the bilge. It is located under the port floorboard just aft of the navigation station seat.

1-7.2.5 EXHAUST SYSTEM

The Yanmar diesel engine has a water cooled exhaust system. A marine exhaust hose carries the exhaust from the engine to the muffler. Used cooling water is injected into the exhaust system at the muffler. The exhaust exits the muffler and travels through a hose to a through-hull fitting on the transom. All exhaust hoses are connected to the engine, muffler or through-hull with double, stainless steel band clamps with a worm drive tensioning device.

It is critical to the operation of the engine that the exhaust system is in good working order. The exhaust system should be inspected regularly. Hose clamps and hoses should undergo physical examination for loose screws or cuts, chafes or crimping in the exhaust hose.

1-7.2.6 DRIVE TRAIN

The engine's propulsive power is delivered from the engine and gear to the propeller by a standard shaftline. The shaft is a 1-1/4" diameter (32mm) length of Aquamet 22 boat shafting. The shaft has a split coupling at the gear end and a standard SAE taper at the aft end. The shaft passes through a PYI dripless shaft seal at the hull intersection. The shaft seal is attached to an FRP stern tube with a 2" OD

(50.8mm). The shaft is supported at the aft end by a BF Goodrich, cutlass rubber bearing which is mounted in a cast silicon bronze strut attached to the hull. The propeller is attached at the SAE taper with a prop nut, jam nut and cotter pin.

NOTE: ***The shaft seal must be purged of air whenever the boat is launched after dry storage. Open the inspection port in the cabin sole aft of the engine box, pull aft on the fluted rubber gasket around the shaft until a small amount of water flows from the fitting, displacing the air.***

1-7.2.7 PROPELLER

The Mk II is equipped with a PYI Max-prop right hand feathering propeller. The propeller is made of cast bronze. The propeller is 483mm diameter and a 356mm pitch with a 1-1/4" bore. The propeller feathers to a streamlined shape when the vessel is not under power. See 3-3.2.4 for feathering instructions.

1-7.2.8 FUEL SYSTEM

The engine burns No. 2 diesel fuel. The MK II has a 55 gallon (208 liter) aluminum fuel tank installed on centerline amidships between frames 5 and 6. The tank is built to USCG standards. The tank has fittings for a fuel supply line, a fuel return line, vent, fill, gauge and gauge sender. The tank has two (2), 150 mm diameter inspection plates. One plate has a 25mm (1") pipe cap with an integral dipstick to measure the fuel level in the tank.

The fuel tank fill plate is a chrome plated bronze fitting with a 38mm diameter (1.5") hose barb. The fill plate is marked DIESEL and is located mid ships on the port side (side deck) above the navigation station.

The vent is a 19mm (3/4") ID hose led to a vent fitting on the transom with a down turned fitting and a flame screen. The fuel valves are packless Kerotest and can be accessed through the inspection port over the bilge sump.

- The fuel supply line is USCG approved hose for fuel use (3/8" diameter, color = blue). The fuel supply to the engine has a stop valve at the tank.
- Excess fuel is returned to the tank via the fuel return line. The fuel return line is also 3/8" USCG approved hose for use with fuel. The return line has a stop valve at the tank.

1-7.2.8.1 FUEL AND FLUID TANK GAUGES

The MK II STC is equipped with a Tank Tender system (Model S 30-6) located on the distribution panel, to monitor the levels of fluids in all tanks on board the vessel. The Tank Tender operates on pneumatic pressure.

Select the tank to be tested and pump very slowly, 1-2 times only. Gauge needle should rise slightly above the level of the fluid in the tank then settle back to the level of the fluid. If the needle pegs over the red line there is probably a kink or blockage in the tubing between the instrument and tank. If the needle goes up then slowly back to zero, the tank is empty or there is a leak between the instrument panel and the Tank Pressure Fitting (TPF). Occasionally, after filling a tank the additional head from the fill pipe will force liquid up into the TPF causing an unusually high reading. Should this be the case, pump very slowly to force liquid out of the TPF to obtain an accurate reading. The Tank Tender Calibration Table posted in the navigation station provides the fluid level in gallons that corresponds to the tank tender gauge number. Note that there are two rings on the gauge, one for water, one for fuel.

Each tank fill cap (except holding tank) is equipped with a dipstick welded to the bottom of the cap. The dipstick is marked, and the marks correspond to readings on the tank tender calibration table in the "Height" column. All readings are in inches from the bottom of the tank. See Table 1-6 Water Tank Level Conversion Chart and Table 1-8 Holding Tank Level Conversion Chart.

CAUTION: if fluid exists in the deck fill pipe, the gauge needle will charge up. Should you observe this, release the push button and use enough liquid to empty the fill pipe before testing again.

Table 1-4 Fuel Tank Level Conversion Chart

Fuel Tank #4

Monitor	Gallons	Height
1.5	2	0.5
2.25	4	1.25
2.75	6.5	3
3.5	8	3.5
3.75	10	4
4	12	4.5
4.5	14	5
4.75	16	5
5	18	5
5.5	20	5.25
5.75	22	5.75
6	24	6
6.25	26	6.25
6.75	28	7.5
7	30	7.75
7.25	32	7.9
7.75	34	8
8	36	8
8.2	38	8.2
8.5	40	8.3
9	42	8.75
9.5	44	9
9.75	46	9.3
10	48	9.75
10.25	50	10
10.5	52	10.2
10.75	53	10.3
11	54	10.75
	55	10.8

NOTE: ***All capacity may not be usable due to heel conditions. A 20% reserve should be kept. FUEL is read on the outer dial, all other tanks are read from the inner dial.***

1-7.2.8.2 FUEL FILTER

To ensure that the fuel delivered to the engine is clean and moisture free, a supply line to the engine has an in-line Racor filter fuel filter/water separator. It is mounted inside the engine compartment on the port bulkhead. It can be accessed through the aft access hatch on the top of the engine box. This filter removes moisture from the fuel through centrifugal and gravitational forces while also trapping particles in a replaceable element. Any water collected can be drained by opening the petcock on the bottom of the glass bowl. Care must be taken to catch the fuel so it doesn't get in the bilge. In addition to these filters, each engine is fitted with its own paper element filter. See engine owner's manual and Racor filter manual for more information.

CAUTION: ***The RACOR filter should be inspected for water and sediment before each time the engine is operated.***

1-7.2.9 CONTROLS

The engine has a single lever Morse MV2 control for putting the engine in forward, neutral or reverse as well as for increasing/decreasing throttle. The engine gear is engaged by pushing the transmission button IN before advancing the throttle. The engine gear is disengaged by pulling the transmission button OUT when the lever is in the vertical or neutral position. The engine will only start when the transmission

button is disengaged, due to the neutral safety cut off mechanism.

Forward operation is achieved by pushing the transmission button in, then pushing the throttle lever forward, reverse by pushing it aft. The more the lever is displaced in either direction, the more the throttle is increased.

1-7.3 ELECTRICAL SYSTEM

The electrical systems generate, store and distribute 12 volt (12v) direct current (DC) power. The system consists of two electrically separate subsystems, each with its own engine-driven alternators, battery bank and battery selector switches:

- The engine start system supplies power to the engine for starting and engine instruments.
- The ship's service (SS), or house system supplies all other loads (navigation systems, pumps, lights, fans, refrigerator, etc) via a power distribution switchboard panel. The house system also directly (not via battery bank selector switch) supplies the 24 hour circuit breaker module located under the nav seat. It provides constant power to the bilge pump, bilge alarm, LPG control panel and fire extinguisher alarm monitors.

Special circuitry permits the engine start and house circuits to be connected in emergency situations, such as alternator or battery failures. See 1-7.3.1.

A 120v AC, single-phase, 30-amp, 60Hz shore power connection provides AC power when in port to the 120v AC Charles Marine 50-amp automatic battery charger that charges both the House and Engine battery banks and to AC outlets at the navigation station.

1-7.3.1 ALTERNATORS

Two 12v DC alternators are mounted on and driven by the auxiliary diesel engine

- The house alternator is a Balmar 90-100-D 100-amp unit with a Balmar ARS four-stage regulator
- The engine start alternator is a Yanmar 60-amp unit.

In the event of an alternator failure a switch can be closed to make electrical output from the remaining good alternator available to charge the other bank providing that the battery selector switches are energized. The Cole Hearsee M-284-01 Alternator Parallel Switch is installed on the inboard face of the seat at the navigation station, and accessed by removing the clear cover. "OFF" position is with lever arm forward at approximately 1600, rotate lever clockwise to turn "ON", counterclockwise to turn back "OFF". See Figure 1-14.

1-7.3.2 BATTERY BANKS

DC electric power is supplied from five batteries configured in two battery banks. The House bank consists of four LifeLine Model 31T Absorbed Glass Mat (AGM) 105 ampere-hour deep cycle batteries This bank provides 420 Amp-hours (20 hr rate) at 12v DC. These batteries are located in a fiberglass tray in a compartment beneath the seat at the navigation station. All are connected in parallel. The positive terminals of the batteries are connected via a heavy cable to the DC distribution panel. The negative terminals are connected to the distribution system ground bus bar Each individual battery has a disconnect switch (on-off) located next to the battery.

The Engine Start bank consists of one LifeLine Model 31T Absorbed Glass Mat (AGM) 105 ampere-hour deep-cycle battery, located in a plastic battery box beneath the cabin sole just forward of the engine compartment. There is a 60-ampere circuit breaker located next to the battery for protection of the battery charger circuit, and a disconnect (on-off) switch under the seat at the navigation station. The positive cable from the battery is led to the engine starting solenoid, and the negative, to the engine block.

In the event of insufficient charge on the Engine Start battery, the parallel switch on the DC distribution panel will parallel the engine and house battery banks to start the engine. The "Parallel Start" push button on the DC distribution panel must be pushed and held while the key at the engine control panel on deck is used to start the engine.

1-7.3.3 BATTERY BANK SELECTOR SWITCHES

Two rotary master selector switches are located on the inboard face of the navigation station seat. The emergency Alternator Paralleling switch is located between the rotary switches.

Figure 1-15 Battery Selection Switches and Emergency Alternator Parallel Switch

1-7.3.4 DC DISTRIBUTION PANEL

The BEP NC32YD distribution panel located at the navigation station has 29 circuit breakers (with 5 spares). Every circuit on the MK II Navy 44 is protected by these breakers and can be isolated for troubleshooting or secured in the event of an electrical fire.

The panel also includes separate BCP 600-DCM battery monitors for the House and Engine Start battery banks, an emergency momentary parallel start indicator light, ammeters and volt meters, and a bilge pump indication light. The panel is hinged on the left (or aft) edge to allow access to the wiring behind it. See Figure 1-16

1-7.3.5 AC PANEL AND SHORE POWER

The 30 amp, single-phase 120v AC shore power inlet is located in the cockpit, aft of the wheel, on the port side. The connection on the boat is notched to match the threads on the shore power retainer ring, and is connected by matching up the notches and turning the retainer ring a quarter turn (not fully threaded).

The receptacle is connected to the AC distribution panel via a double pole main circuit breaker located to port in the aft quarter berth compartment. It is labeled “120 VOLT 60 HZ MAIN BREAKER” The small panel underneath labeled “POWER FAULT” is for a galvanic isolator that has been replaced by an isolation transformer, therefore the POWER FAULT is disconnected. An isolation transformer feeds a separate AC distribution panel, located immediately under the DC distribution panel in the nav station. This panel features the AC main circuit breaker (for shore power), a reverse polarity indicator light, a circuit breaker for the two 120v AC outlets at the navigation station and the battery charger breaker. The Charles Marine 5000SP 50 ampere battery charger is located in the port compartment aft of the engine box near the seawater through-hull. See Figure 1-16 and Figure 1-17.

Reverse polarity occurs when the hot and neutral on the incoming AC current are backwards. This can cause the ground on board the vessel to be energized, and can be an indication of a faulty cord or faulty wiring on the dock. The isolation transformer in the system prevents galvanic current. To check operation if the shore power doesn’t turn on, unplug the shore end of the power cord first; then unplug the boat end. Examine the ends of the cord for the proper number of prongs (on the male, shore end) and corresponding slots (on the female, ship end). Reconnect the cable in the same order; boat first, then shore outlet. If the problem persists, ask for assistance from the Cutter Shed or marina manager to determine if the problem lies in their infrastructure or your cord.

Fig 1-16 AC Main Breaker Panel - Aft Compartment

1-7.3.6 BONDING AND GROUNDING

The Navy 44 MK II has an electrical ground bonding system installed for “cathodic protection” that connects all metallic parts of any mass. The purpose of the bonding system is to provide a low resistance path for electrical connections between all underwater fittings, fuel fills, fuel tank tanks, and engine. This keeps all equipment at essentially the same electric potential (ground). This reduces the effects of galvanic corrosion and electrolysis. In addition, this vessel has an isolated lightning protection system where the chainplates, sea cocks and the mast are connected directly to the keel as required by ABYC boat building standards.

1-7.3.7 LIGHTING AND FANS

The Navy 44 is outfitted with a 12v DC lighting system throughout the boat for navigation, deck floodlight, and cabin lights. The cabin overhead of the Navy 44 is fitted with nine (9) night vision red or white dome lights. The red light is LED, the white light is a 10 watt halogen light. Each light can be individually controlled with its own switch. The cabin light system is energized with switches for Cabin Lights Port, and Cabin Lights Stbd at the switchboard panel. See Figure 1-17.

Five DC electric fans help cool the interior. The fans are located in the galley, the navigation station and in the berthing areas. The fans are on one circuit on the DC panel and they are controlled locally with an integral switch.

1-7.3.8 NAVIGATION LIGHTS

There are two sets of navigation lights:

- Navigation Lights: Aqua Signal combination red/green light on the bow pulpit**,** and Aqua Signal white stern light on the radar post
- Tricolor Light: Aqua Signal combination Tricolor light with red, green, white sectors at the masthead.

A white steaming light is located on the front of the mast, just above the lower spreaders, to be used in combination with deck level navigation lights while motoring.

A 360° white anchor light is located immediately beneath the Tricolor and is activated by a switch on the switchboard panel marked “anchor”

The DC Distribution panel has a vessel silhouette with small red LEDs that indicate which navigation lights have been selected and are “ON”.

1-7.4 COMMUNICATION AND NAVIGATION SYSTEMS

Communication and navigation systems are located at the navigation station inside the cabin. This area includes a chart table for the storage of paper charts, navigation tools and a book shelf for publications.

Table 1-5 Communication and Navigation Systems

SYSTEM	MAKE/MODEL
VHF Radio	ICOM IC-M504 & Command Microphone
HF Radio	ICOM IC-M802
Radar	Furuno 1834C radar w/ 4Kw antenna mounted on the starboard quarter
Display/Chart Plotter	Furuno 1920C video plotter Furuno BBWGPS WAAS/GPS/Chart Plotter
Weather Fax	Furuno FAX-30
GPS	Furuno GP-320B
AIS	Furuno FA50
Fathometer	B&G Hydra 3000
Knotmeter	B&G Hydra 3000

1-7.4.1 NAVIGATION STATION AND CHART TABLE

The chart table is approximately 3 feet 7 inches long by 2 feet 2 inches wide, with a hinged top that provides access to chart stowage underneath. The house battery bank occupies the space under the navigation station seat. The controls and displays for the electronic navigation and communication systems are mounted on the port and forward bulkheads of the navigation station.

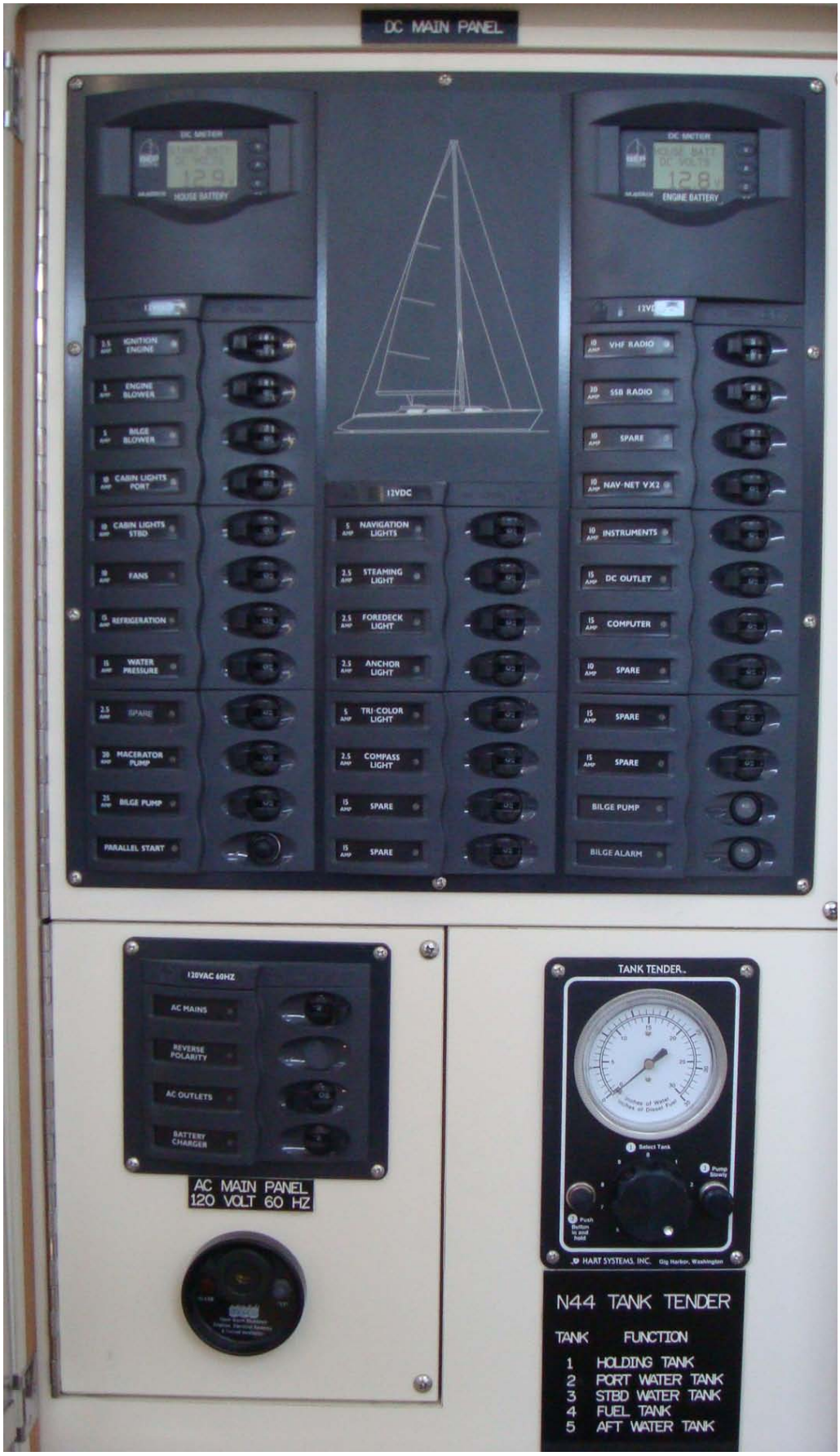


Figure 1-17 DC Main Panel, AC Panel, and Tank Tender Gauge.

1-7.4.2 VOICE COMMUNICATIONS

The voice communications systems aboard the Navy 44 Mk II include:

- A Very High Frequency (VHF) radio for primary (RF line of sight) communications on low power (1 watt) and up to 25 nm on high power (25 watts).
- A High Frequency (HF) / Single Sideband (SSB) radio for long range communications.

1-7.4.2.1 VHF RADIO

The ICOM IC-M504 VHF radio has 57 US, 57 international and 61 Canadian channels, as well as 10 preprogrammed marine weather channels. It can scan any number of selected channels. Several different scanning patterns are available. A dual or tri-watch mode permits monitoring Channel 16 while listening on a different channel. There are two microphones: one in the cockpit (with built-in channel and volume controls, which also displays latitude/longitude) and one at the navigation station.

NOTE: *The remote Command MIC VHF microphone in the cockpit tends to get knocked into, and should be checked periodically to ensure that the desired channel or scan is still operating.*

The radio also has Maritime Mobile Identity Service (MMSI) capability. This is an emergency broadcast on Channel 70. The radio has a dedicated Channel 70 secondary receiver but it uses the same antenna as the normal receiver. **Lift the protective cov**er**, push and hold the red "distress" button on the radio for five seconds to transmit a distress call.** The boat is programmed with a number that identifies the boat to the receiver of the call. If the GPS is turned on, the distress location will be transmitted automatically; otherwise, the vessel's location must be entered manually.

1-7.4.2.2 HF/SSB RADIO

The ICOM IC-M802 HF/SSB transceiver can store up to 160 operator-programmed channels. The insulated backstay of the vessel is used as an antenna. This antenna also services the facsimile receiver (FAX) incorporated into the Furuno NAVNET system. There is a switch located on the forward face of the bookshelf in the navigation station that must be turned to either Fax or SSB to enable either function. See NOTE below at WEATHER FACSIMILE RECEIVER.

1-7.4.3 NAVIGATION SYSTEMS

1-7.4.3.1 GLOBAL POSITIONING SYSTEM

A Furuno GP-320B GPS system is integrated into the NavNet display unit. The antenna is mounted atop the radar antenna. The GPS receiver has WAAS (Wide Area Augmentation System) capability. WAAS, available in North America, is a provider in the worldwide SBAS (Satellite Based Augmentation System) navigation system. An SBAS provider furnishes GPS signal corrections to SBAS users, for even better position accuracy, typically within three meters.

1-7.4.3.2 RADAR

A Furuno model 1834C radar with a 4kW antenna is mounted on a radar mast on the starboard quarter of the vessel. The radar display is integrated into the Furuno GPS/Chart Plotter display unit.

1-7.4.3.3 WEATHER FACSIMILE RECEIVER

The facsimile receiver is also connected to the 10.4-inch NavNet series display unit. The FAX-30 receives facsimile images and Navtex messages, transmitted from facsimile and Navtex stations. It may be programmed with all existing facsimile stations and frequencies. User may program 320 channels. It offers fully automatic facsimile operation with built-in schedule timer; storage for 30 timer programs; fully automatic selection of speed, IOC, phase alignment and frequency (manual selection is also available) connection to printer via a PC to print facsimile images and Navtex messages; facsimile images in monochrome, gray scale (8 tones) or color (three patterns), and a built in Navtex receiver. (*The receiver does not conform to GMDSS regulations*.)

NOTE: ***The FAX 30 uses the HF radio antenna. To enable facsimile reception, the HF antenna rotary switch located on the forward bulkhead of the bookshelf in the navigation station must be switched to "FAX". When the facsimile reception is completed, the switch must be returned to "SSB" position BEFORE operating the HF radio.***

Figure 1-18 Antenna SSB/Fax Switch

1-7.4.3.4 AUTOMATIC IDENTIFICATION SYSTEM (AIS)

A Class-B AIS transponder/receiver is integrated in the NavNet display unit, with an overlay on the chart plotter. This unit receives AIS information from other vessels equipped with AIS A or B, and displays their position on the electronic chart and course/speed over the ground, heading, rate of turn and other data such as safety messages in a data box when the cursor is placed over the vessel icon. It also transmits this data from the Navy 44 to other vessels.

1-7.4.3.5 SAILING PERFORMANCE INSTRUMENTS

The Brooks & Gatehouse (B&G) Hydra 3000 Central Processor Unit (CPU) integrates and computes raw data from sensors and makes them available to displays at the chart table and on the panel mounted over the companionway. There is a Graphic Function Display (GFD) at the chart table that can display up to seven pieces of data and a variety of graphical screens. Two Full Function Displays (FFD) are on deck visible to the helmsman, and can be configured to show all available data in a dual line display. Two analog displays show apparent wind angle and magnified apparent wind angle.

- The B&G Hydra 3000 Masthead Unit measures the wind speed and angle at the masthead.
- Heading is obtained via the Halcyon 2000 compass, a high performance electronic fluxgate compass. The Halcyon 2000 compass has the ability to 'learn' the magnetic effect of the vessel on the compass and automatically apply deviation corrections.
- Two removable paddlewheel speed sensors provide boat speed. Plastic dummy plugs are provided to insert when the paddlewheels are out for cleaning or maintenance. Paddlewheels are removed by unscrewing the smaller diameter retaining ring. The through-hull gravity switch for the speed log transducers is located in the forward port locker opposite the head compartment, on the forward face of the bottom compartment.
- The depth finder unit is a removable through hull unit. The depth datum is fully adjustable. Sensors for the Navy 44 STC are normally calibrated to the waterline, to read total water depth.

1-7.4.3.6 NMEA ELECTRONIC INTEGRATION AND LAPTOP INTERFACE

A MiniPlex-41BT provides interface for up to four NMEA systems, and has a laptop serial port access. This unit has a Blue Tooth interface to connect the NavNet system to a laptop computer at the navigation station. The GPS, B&G instruments and VHF/HF radios are all integrated, so that, for example, GPS location is available on the VHF display screen and is broadcast via the MMSI distress button as long as the GPS is turned on.

1-7.4.4 NON-ELECTRONIC NAVIGATION INSTRUMENTS

Non-electronic navigation instruments on board include magnetic compasses and a barometer. ***A sextant may be requested from the Sailing Center***.

1-7.4.4.1 MAGNETIC COMPASS

The main magnetic compass is a 6-inch RITCHIE Globemaster, Model D-615EP mounted on the Edson steering pedestal in the cockpit and is used by the helmsman. The compass card is scribed in 5-degree increments, and is equipped with 45 degree and 90 degree offset lines. It is equipped with low level 12v DC lighting. A removable sliding door anodized stainless steel hood helps to protect the face of the compass.

1-7.4.4.2 BAROMETER

A barometer is mounted on the forward bulkhead of the navigation station to monitor weather changes.

1-7.5 FRESH WATER SYSTEM

The potable fresh water system has three welded, Type 316L, stainless steel storage tanks. Two 70-gallon port and starboard tanks are installed under the main cabin berths. These water tanks are connected to the potable water system via the smaller 35-gallon "day tank" installed beneath the cabin sole on centerline

Each tank has a fill connection, a vent connection and a supply connection to the pumps, with a shut off valve (ITT Jabsco Model 45570). The water tanks are filled via deck plates (marked **WATER**) located on the port and starboard side decks just forward of the mast. ***Make sure to securely close the water fill deck plate once the tanks are filled, ensuring o-rings are in proper position*.**

Each tank also has two 6" inspection plates. The aft plate on each tank has a 25 mm pipe cap with an integral "dip" stick to gauge the water level in the tank***. This is a manual back-up for the tank monitor system described in 1-7.2.8.1.***

The starboard tank shut off valve is inside the galley sink cabinet, under the floorboard. The port tank shut off is accessed by removing the bottom drawer of the navigation table.

The vented loops are 1/2" hose and are lead up to deck level and back down to the cabin sole in the port forward equipment locker and in the starboard head compartment.

All hose lines have drains at low points to allow the system to be drained completely.

1-7.5.1 PRESSURIZED FRESHWATER SYSTEM

A DC-powered PAR model Max 4r pump with a PAR No. 31620-0092 accumulator tank provides pressurized freshwater to the galley sink, cockpit shower and head sink. The pump has a switch to turn on at 20 psi (pounds per square inch) and shut off at 40 psi. The accumulator allows some pressure retention so that the pump does not run every time water is used. The galley sink and the head sink each have a shower/mixer faucet. The galley sink has an in-line filter to trap solid particles introduced from the supplied water or collected in the tank(s).

1-7.5.2 MANUAL FRESH WATER SYSTEM A Gusher Mk III type foot pump supplies fresh water to the galley and head sinks.

1-7.5.3 GRAY WATER SYSTEM

Gray water (drain water) is discharged in two ways. The galley sink drain goes to a through-hull installed below the galley. The water from the shower in the head is drained directly to the bilge sump and is pumped overboard by the bilge pump.

1-7.6 SEAWATER SYSTEM

A sea water plumbing system is installed. The system serves only the galley sink. The system has a single seacock and an in-line strainer PAR No 36400-0000. The hose is ½" Nautical Rubber series 164. The system is manual only with a Gusher Mk III foot pump below the galley sink.

1-7.7 BILGE PUMPING SYSTEM

The Navy 44 is equipped with one automatic electric bilge pump and two manual bilge pumps.

Table 1-6 Water Tank Level Conversion Chart (see 1-7.2.8.1 Fuel and Fluid Tank Gauges)

Port Water Tank #2			Starboard Water Tank #3			Day Tank #5		
Height	**GAL**	**Monitor**	**Height**	**GAL**	**Monitor**	**Height**	**GAL**	**Monitor**
3	5	3	3	5	4	1.75	4	1
5	10	7	5	10	7	2.5	6	1.75
6.5	15	8.5	7	15	8.5	3	8	2.5
8	20	10	8.5	20	10	3.5	10	3
9	25	11	9	35	11	4	12	3.5
10	30	12	10	30	12	4.75	14	4.5
11	35	13	11	35	13	5.25	16	5
12	40	14	12	40	14	6	18	6
13	45	15	13	45	15	6.25	20	7
14	50	16	14	50	16	6.75	22	7.5
15	55	17	15	55	17	7.75	24	8
16	60	17.5	16	60	18	8.75	26	8.5
17	65	19	17	65	19	9	30	9.5
18	68.5	20	18	68	20	9.5	32	10
						9.75	33	10.5

NOTE: Read the monitor from the tank tender on the electrical circuit breaker board in the navigation station. The height from bottom of tank is read from the dipstick that is attached to the bottom of the fill lid on top of the water tank.

1-7.7.1 AUTOMATIC BILGE PUMP

A Rule model 3700 SSS (3700 GPH) electric pump with an integral strainer is located in a sump under the cabin sole on centerline inboard of the navigation table. The electric bilge pump will pump water overboard through a vented loop and discharges through the manual bilge pump overboard through-hull.

Note: The electric bilge pump is located in the upper part of the main bilge sump area. It is always powered via the 24 hour circuits module and will come on when water reaches the float switch, or if the breaker is activated. The manual pump located in the bilge is used to empty the sump for normal operations, since it reaches into the deepest part of the keel sump.

Warning: If the bilge pump is activated by the automatic switch, an audible alarm will sound, indicating high water in the bilge.

1-7.7.2 MANUAL BILGE PUMPS

The Navy 44 is also equipped with two manual bilge pumps. A 40 GPM Edson aluminum diaphragm pump, model 638A is located under the cabin sole near the navigation desk. The handle to the pump is secured to the forward bulkhead of the wet locker. This is the pump normally used to empty the main bilge. A 17 GPM Whale Gusher 10 aluminum diaphragm pump is located in the cockpit under the aft end of the port cockpit seat. The handle is located on the inside, inboard face of the cockpit locker. The pumps are activated by pumping the lever on the pump. Each pump has its own strainer (strum box), which should be checked periodically for debris, and cleared.

The Edson pump discharges via a vented loop out a through-hull that it shares with the automatic electric pump. The Gusher pump discharges through the transom.

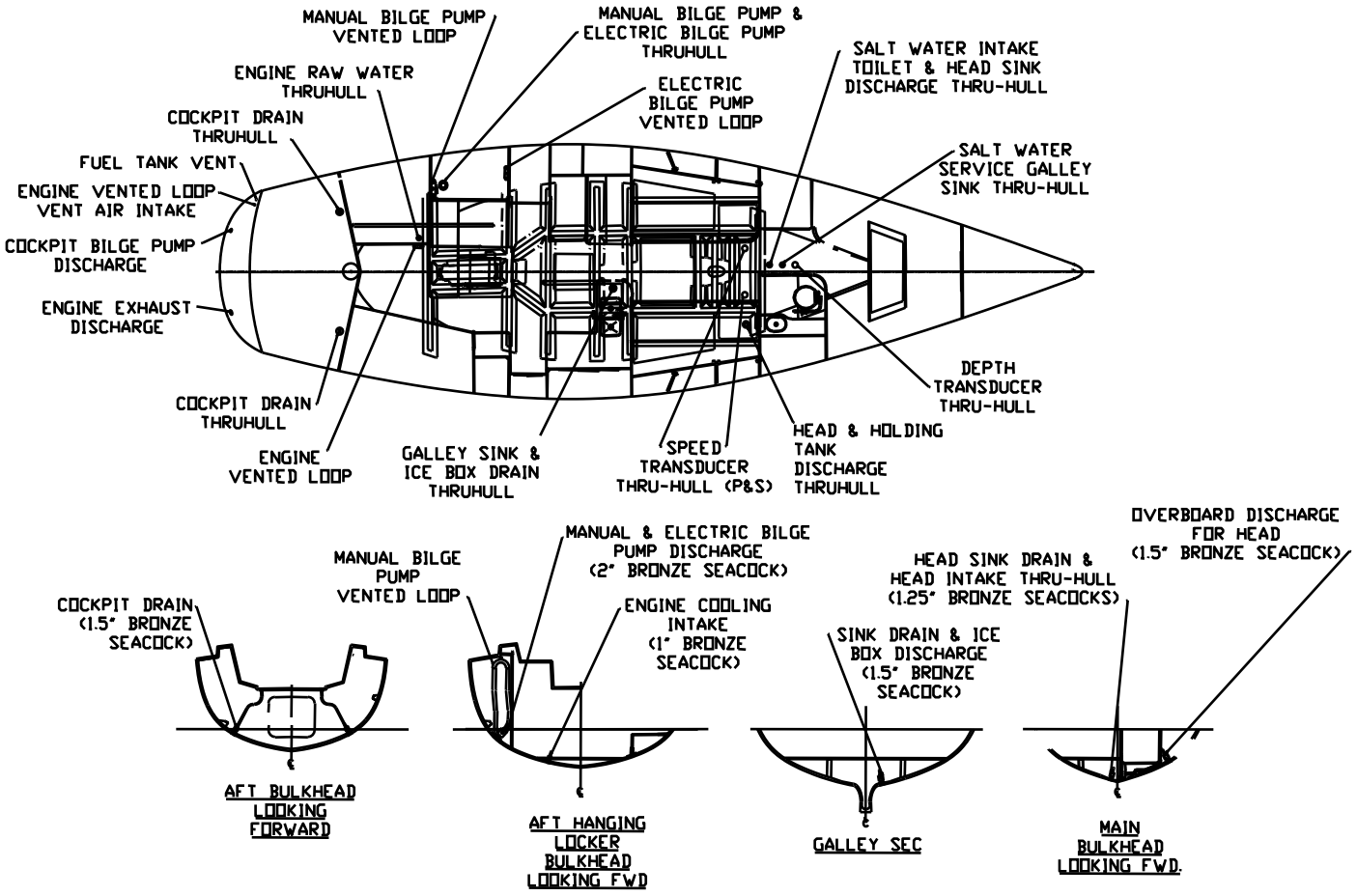
1-7.8 THROUGH-HULL FITTINGS

For a tabulation of fittings below the waterline that have seacocks installed see Table 1-7, Through-Hull Fittings. Figure 1-19 shows fitting location. Not included on the list are the hull penetrations for the propeller shaft and rudder.

Table 1-7 Through-hull Fittings

	THRU-HULL DESCRIPTION	*SIZE*	*LOCATION*
1	DEPTH TRANSDUCER	40 mm	FWD, CENTERLINE
2	GALLEY SALT WATER INTAKE	1.25"	FWD, CENTERLINE
3	HEAD INTAKE & HEAD SINK DISCHARGE	1.25"	FWD, CENTERLINE
4	SPEED TRANSDUCERS (PORT)	50 mm	FWD CABIN BY MAST (PORT)
5	SPEED TRANSDUCERS (STBD)	50 mm	FWD CABIN BY MAST (STBD)
6	HEAD & HOLDING TANK DISCHARGE	1.5"	STBD FWD OF WATER TANK
7	GALLEY SINK AND ICE BOX DISCHARGE	1.5"	UNDER GALLEY SINK
8	MANUAL & ELECTRIC BILGE PUMP DISCHARGE	2"	PORT AFT END OF WET LOCKER
9	ENGINE SALT WATER INTAKE	1"	PORT SIDE COMPARTMENT AFT OF ENGINE BOX
10	COCKPIT DRAIN (PORT)	1.5"	RUDDER QUADRANT COMPARMENT
11	COCKPIT DRAIN (STBD)	1.5"	RUDDER QUADRANT COMPARMENT

Figure 1-19 Through-hull Diagram



1-7.9 INTERIOR SYSTEMS

1-7.9.1 STOVE

The galley stove is a Force 10 three-burner stove with an oven and broiler and has an automatic oven fuel shutoff. The stove burns liquefied petroleum gas (LPG). The LPG is stored in two 4.5kg (10lb) tanks in a separate and dedicated bin in the aft starboard lazarrette locker. The cockpit container is fumetight and has a "drain" that leads overboard**. LPG is heavier than air, and thus sinks. It is critical that this "drain" is kept clear.**

The system is equipped with a Trident Model #1300-7758 LPG control and detection system. The system has a single hose gas bottle connection with a pressure regulator and pressure gauge. An electrically controlled remote solenoid valve on the tank controls the gas flow from the tank. When the solenoid valve is off, there is no gas in the hose leading up to the stove. Each time the stove is used – the gas valve must be opened on the tank in the cockpit and closed afterward.

NOTE*: When operating the stove, be sure to turn off the tank valve before the burners and/or oven and the LPG solenoid located on the galley cabinet face under the sink. This ensures the flame consumes all the gas in the line between the tank and the stove.*

WARNING: LPG has a sulphurous odor added so that it is more easily detectible. If you smell sulpher, evacuate personnel from cabin, secure the LPG system immediately and open hatches for air ventilation.

To change propane supply from one bottle to the other;

1. Manually turn off the supply valve on the empty bottle.
2. Undo the supply line at the bottle using a crescent wrench.
3. Transfer supply hose to full propane bottle.
4. Tighten supply hose using a crescent wrench. Do not over tighten.
5. Open supply valve. Check for leaks at bottle.

1-7.9.2 REFRIGERATOR

The Navy 44 is equipped with a two door, top opening, 6 cubic foot refrigerator located in the galley countertop, starboard side. All boats have the TECHNAUTICS COASTAL 12 VDC system. The compressor unit is located on the aft side of the bulkhead at the foot of the quarterberth. The holding plate is located in the refrigerator (reefer) compartment. A thermostat located inside the aftermost door of the reefer controls the temperature of the reefer box. The thermostat should be set such that the refrigeration system cycles to maintain temperature. A setting of 2-3 once the unit is cold is usually sufficient. This system draws power from the house battery banks through the DC switchboard panel.

Running the refrigerator in port will require the DC portion of the DC switchboard to remain energized via the house battery switch. At sea, a longer charging time will be experienced with the refrigeration system running, time dependent upon the thermostat setting. Close monitoring of the house battery bank condition is recommended.

A thaw drain line leads from the bottom of the reefer compartment to the Whale Gusher MK III foot pump located on the front face of the galley sink at floor level.

1-7.9.3 GALLEY SINK

A double stainless steel sink is mounted in the countertop of the galley and is fitted with three spigots, and three foot pumps. The main spigot, is a Grohe G-1/2 31 634, fitted with a six foot hose allowing the spigot to be pulled out of the sink receptacle as a telescoping faucet. A selector lever in the top of the spigot selects direct flow or spray. The blue knob controls pressure fresh water. The red knob controls fresh water supplied by the foot pump located on the front face of the sink compartment at floor level. The other two spigots are (2) Fynspray WS6 swiveling spouts: one for the reefer drain, (starboard side of the sink), and one for pressure sea water, (port side of sink). These spigots are connected to the foot pumps at the base of the sink.

1-7.9.4 MARINE HEAD

The vessel is equipped with a Wilcox Crittenden "Skipper II" hand operated marine toilet. The head will normally drain to the stainless steel holding tank. Seawater for flushing is pumped into the head via a

through-hull and seacock located just outside the head door. There is a strainer in line. There is a bronze Y-valve under the head vanity that allows selection between discharge to the on-board holding tank or direct discharge overboard. The discharge line is fitted with a cast bronze vented loop. The holding tank can be pumped out to a shore disposal facility through a deck plate or emptied via the macerator.

1-7.9.5 Y-VALVE

The Y-valve allows the waste from the toilet to be pumped directly overboard. When the Y valve is in the "overboard" position, the waste is pumped up through a vented loop and then overboard through a through-hull located under the starboard settee berth at the waterline. The vented loop ensures that this path is only one way (i.e. from toilet overboard) and water cannot backflood from outside the vessel into the hull through the toilet.

1-7.9.6 MACERATOR AND HOLDING TANK PUMP-OUT

The holding tank can be emptied two ways. Black water (holding tank contents) can be taken out through the pump-out deck fittings at approved pump-out stations or from pump-out boats. The contents of the holding tank can also be emptied overboard by using the macerator pump when the STC is the appropriate distance offshore. See 3-3.7 for instructions.

1-7.9.7 HOLDING TANK

The holding tank is a 50 gallon Type 316L stainless steel tank. The tank is located in the forepeak beneath the lower pipe berths and is secured to its foundation with stainless steel straps. The tank has two 1-1/2" female threaded ports:

- one is the intake from the head
- the other is for shore side pump out.

The tank also has a 5/8" port for venting. The vent is led overboard to a vent fitting on the starboard side of the boat outboard of the head compartment.

All hose used in the system is expressly built for sanitation service. This hose is specially manufactured to make it resistant to absorbing sewage and other chemicals. It is also made of special materials that make it impervious to odors. If these hoses are ever replaced – the replacement hose shall be specifically rated for sanitation service.

Table 1-8 Holding Tank Level

Holding Tank #1		
Monitor	**Gallons**	**Height**
1	2	N/A
2.5	4	N/A
4.5	6	N/A
6	8	N/A
7.5	10	N/A
8	13	N/A
8.5	14	N/A
9	16	N/A
9.5	18	N/A
10	20	N/A
11	22	N/A
11.5	24	N/A
12	26	N/A
13	28	N/A
13.5	30	N/A
14.5	33	N/A
15	35	N/A
15	36	N/A
16	38	N/A
16.5	40	N/A
17	42	N/A
20	43	N/A

monitor in inches of water

1-8 LIFE SAVING EQUIPMENT

The safety equipment required aboard the MK II for local sorties and offshore passages is governed by US Coast Guard requirements and the ISAF Offshore Special Regulations Governing Offshore Racing for Monohulls & Multihulls, Category 1. Additional information on procedures and equipment can be found in Chapter 5 and in the Standard Operating Procedures (SOP).

There are three 5 lb and one 10 lb fire extinguishers located on board, one in the port line locker in the cockpit, one at the aft end of the quarterberth, one behind the navigation station and one on the forward starboard bulkhead of the main salon. In addition a heat activated Sea Fire inert gas extinguisher is

mounted inside the engine box. This will activate automatically or can be manually activated by a T-handle in the cockpit next to the throttle.

An Elliott 10 man liferaft is located in a locker on the stern of the MK II. The locker cover is not attached to the boat, and is designed to be tossed away when the cover is opened. Ensure the liferaft is tied to the boat with the painter line prior to embarking.

Crew overboard recovery equipment is located on the aft pulpit (pushpit). This includes the Lifesling with a strobe light, which should be tied to the boat. The heaving line should be in close proximity to the helmsman, attached to the boat. The danbuoy/strobe/horseshoe buoy should be tied to each other, but not the boat. These should be deployed immediately for the person in the water and to mark the location.

An EPIRB (Emergency Position-Indicating Radio Beacons) unit is a tracking transmitter used by Search and Rescue (SAR) teams to locate a vessel in distress. Digital signals are broadcast to a satellite system to triangulate SAR efforts. Each beacon is registered with NOAA, and has a unique code for each boat, therefore, you need to ensure you have the proper beacon on board.

Emergency exits are the companionway hatch, the large Bomar deck hatch between the galley and navigation station and the forward sliding hatch.

CHAPTER TWO
CREW REQUIREMENTS & TRAINING

2-1 INTRODUCTION

The NAVY 44 is the principal U.S. Naval Academy Sail Training Craft. The fleet was designed and is equipped to accomplish the missions of sail indoctrination and command seamanship training for 3/C, 2/C and 1/C midshipmen. It is also raced by varsity offshore team crews with minor configuration changes.

The normal offshore training crew for varsity races consists of a Coach, an Assistant Coach and/or midshipman Skipper, a midshipman Executive Officer (XO), and six crew, for a total complement of ten. The normal crew for Offshore Sail Training (OSTS) consists of a Skipper, an XO, and eight 3/c midshipman crew. Crew qualifications for these training and racing missions are published by the Director of Naval Academy Sailing (DNAS) by separate notice or instruction.

The minimum crew for safe operation of the Navy 44 may be as few as one Skipper/Coach and two qualified crew, depending upon sailing area, anticipated weather and experience of other participants embarked. Guidance concerning operating the Navy 44 with limited crew, introductory/indoctrination and proficiency sailing missions is contained in the STANDARD OPERATING PROCEDURES (SOP).

2-2 CREW DESIGNATIONS, QUALIFICATIONS & REQUIREMENTS

Persons participating in the Naval Academy Sailing offshore training program and Navy 44 assigned operational duties shall be designated in accordance with the current Additional Qualification Designators (AQD).

Although other designations may apply to certain individuals, the following categories define levels of experience, and mastery of sailing theory, systems knowledge and operational procedures of the Navy 44's offshore training role:

- Trainee - all participants not otherwise designated as offshore crew, navigation plotter, watch-captain, skipper, or master skipper.
- Senior Crewman - individuals who through experience and training are familiar with sail theory, safety procedures, and basic engineering of cruising auxiliaries similar to the Navy 44.
- Navigation Plotter – individuals who through experience and training have mastered navigation plotting, chart preparation, and identifying navaids.
- Watch-Captain - individuals who through experience and training have mastered theory, boat systems, and demonstrated competence in all routine aspects of operating a large offshore cruising auxiliary.
- Skipper - individuals who through experience and training have demonstrated their ability to command a large offshore sail training craft (NAVY 44 or equivalent) over a wide range of weather conditions, in coastwise piloting waters as well as offshore passages.
- Master Skipper – individuals who through extended blue water sailing time and continued training have demonstrated their advanced ability to command a large offshore sail training craft over a wide range of conditions.

NOTE: ***All personnel authorized to operate, or participate in the operation of U.S. Naval Academy Sail Training Craft (Navy 44's) should be familiar with and have recent experience using the systems, emergency procedures and safety equipment applicable to the Navy 44.***

2-3 FAMILIARIZATION TRAINING

Prior to participating in the operation of the Navy 44 it is advisable to complete a period of familiarization training or some other source of structured training designed to acquaint the operator with the systems, cautions, emergency procedures and practices which are unique to this fleet of boats.

In addition, those individuals who have previously been assigned as Officers-in-Charge but who have no documented Navy 44 sailing experience within the past 12 months should complete a review and refresher program. Individuals must demonstrate capability and knowledge of applicable topics listed in the following:

Shore-side Syllabus

1. Review crew responsibilities and tasks aboard the Navy 44, including use of ship's bills and checklists.
2. Discuss and complete the "Sail Training Craft Request Form" for operations in the local sailing area.
3. Inventory, locate and describe operation of all required safety equipment.
4. Demonstrate knowledge of how to comply with Rules 32 through 38 of the COLREGS using the sound signals aboard the Navy 44; and the location of lights and day shapes for compliance with Rules 20 through 31.
5. Discuss heavy weather techniques, emphasizing use of inner-forestay, running backstays and storm sails as provided to the Navy 44.
6. Discuss Quick-Stop and Lifesling type recovery procedures, noting location of applicable deck hardware, safety equipment and its location in the boat stowage plan, and materials available to affect victim recovery.
7. Discuss and demonstrate use of communications and navigation equipment. Discuss boat's fuel capacity, fuel consumption and cruising range under power.
8. Discuss the list of manuals, publications and documents included as standard load-out. Discuss the maintenance documentation system, the discrepancy report process and equipment tag-out steps.
9. Describe and discuss a plan of action for steering failure, engine failure, broken through-hull fitting and other emergency procedures contained in Chapter 5.

Underway Syllabus

10. Demonstrate appropriate helmsman and crew coordination for departure under power: line handling, fending-off, and a recovery plan for an engine failure in a crowded basin or harbor.
11. Demonstrate ability to maneuver under sail in close quarters: short tacks and controlled jibes.
12. Demonstrate Crew Overboard procedure: evaluating ability to maintain visual contact with the victim, minimizing distance traveled away from victim, and ability to direct and deploy safety equipment.
13. Demonstrate use of check-sheets for daily checks of engine, and communicate status of all boat systems, weather, position and water/fuel levels aboard the Navy 44 during daily situational reports to the OTC.
14. Demonstrate safe use of galley equipment, stove, oven, and refrigeration systems.
15. Understand and demonstrate proper navigation doctrine, ensuring use of applicable tide tables, piloting and dead reckoning procedures.
16. Demonstrate the correct use of hand bearing compass, fixing boat position, estimating time/speed calculations, use of danger bearings, and other accepted plotting and labeling techniques.
17. Demonstrate heavy weather procedures: shortening sail, use of preventer, and sailing with storm sails.
18. Select an anchorage and demonstrate appropriate helmsman and crew coordination skills for anchoring under power and the ability to pick up a mooring.
19. Demonstrate correct operation of advanced electronics such as the sail instruments, VHF and SSB radios, GPS, radar and weather fax.
20. Demonstrate the correct hoisting, trimming, dousing and packing of the spinnaker.

2-4 WAIVERS

The Director of Naval Academy Sailing (DNAS) may waive certification or participation in the syllabus training for special cases where an individual can demonstrate the requisite knowledge and proficiency of skills for Command at Sea. USCG licensing and personal logbooks are ways, but not the exclusive avenues upon which such waivers can be granted.

2-5 UNDERWAY WATCH ORGANIZATION

A typical underway watch organization for each of the Navy 44 mission areas can be found in the DNAS' Standard Operating Procedures (SOP) manual. While underway, the prescribed on-deck crew should be assigned as follows:

1. Should consist of a minimum of two crew topside at any given time.
2. The functions of watch-captain, helmsman, lookout and navigation should be assigned or assumed by those on watch.
3. Functions may be rotated among the on watch crew as directed by the Skipper/Coach.

To facilitate crew administration and preparations for summer training and race/cruise periods, it is recommended that crew members be assigned to primary billets such as navigator, engineer, supply officer, and deck officer. The duties and responsibilities of these billets are detailed in the Standard Operating Procedures (SOP) manual.

2-6 RECORDS

The Naval Academy Sailing Program provides a sailing log book analogous to the Official Naval Aviator's Log Book that is intended for recording your sailing experience and time on the water. Qualifications will be recorded as each Additional Qualification Designator (AQD) is achieved.

CHAPTER THREE
NORMAL PROCEDURES

3-1 SHORE SIDE PROCEDURES

The Director of Naval Academy Sailing publishes shore side procedures, scheduling, maintenance records/reports, and Santee Basin operations separately. Applicable references include:

- DNASINST 3120.1E, Standard Operation Procedures (SOP) for large Sail Training Craft (STC)
- PRODEV OPORD 201, (current year).

3-2 PRE-UNDERWAY PROCEDURES

Conduct the following pre-underway checks. The Skipper or Coach must verify that they have all been performed prior to getting underway.

Prior to engine start:

- Pre-Sortie "walk around" checks
- Hull Integrity checks
- Safety equipment checks
- Align the electrical system for underway operation
- Engine Pre-Start checks

Checks to be accomplished prior to getting underway are:

- Successful engine start
- Sail inventory to support planned evolutions
- Communications and Navigation checks
- Stores quantities checks
- Crew brief

3-2.1 WALK AROUND CHECKS

- Check trim of boat at rest. Note any abnormalities, i.e. bow down, listing, high/low in the water, mast/ boom in proper condition, cockpit integrity.
- Check docking lines for effectiveness and chafe. Check shore power cable for integrity.
- Check that all lifelines, stanchions and pulpits are tight, securely fastened, pinned, and taped.
- Check condition of standing rigging and turnbuckles. Ensure cotter pins are inserted, split and taped.
- Check the condition of halyards for defects on rope tails, splices, and shackles.
- Spin all winches several turns to assure proper lubrication.
- Check the steering wheel for free rotation and wire rope mechanisms on the steering system below the steering pedestal. (Adjust wire rope tension for proper play with Skipper/Coach supervision). Ensure steering pedestal friction brake knob is in the unlocked position and that the wheel is centered.

REPORT WALK AROUND CHECKS COMPLETE TO THE SKIPPER/COACH

3-2.2 HULL INTEGRITY CHECKS

- Check bilge area for dirt or debris that might clog the bilge pumps and remove. Check the engine pan and bilge for oil or diesel fuel. Environmental regulations prevent discharging oil in coastal waters. Both minor and major pump-out facilities are available to remove oil from the bilge.
- Test the primary manual bilge pump by discharging any standing bilge water. Do not prolong test while in port.
- Ensure the seacock for the sea water engine cooling system is open.
- Check all seacocks and waterline integrity of the hull. Note signs of leakage from sea water, fresh water, and rain.
- Check fresh water tank levels for adequate water. Fill 35 gallon day tank from one of the 70 gal tanks.

NOTE: ***Ensure that shut-off valves for the 70 gal tanks are closed after filling the day tank. Failure to do so may result in a loss of potable water from plumbing leaks or an open valve.***

- Check the through-hulls for the head and the "Y" valve for the MSD system. Set for INSHORE operation.

REPORT HULL INTEGRITY CHECKS COMPLETE TO THE SKIPPER/COACH

3-2.3 SAFETY CHECKS

- Check that inflatable life raft (if issued) is stowed in the stern compartment, with the painter line tied onto the boat, and that the transom release mechanism is properly secured.
- Inspect kapok lifejackets for serviceability. Ensure that there is at least one for each crewmember onboard. They should each have reflective tape, whistle and strobe light attached.
- Determine if personal flotation/harnesses are aboard for heavy weather or night operations. Check these for proper assembly and serviceability. Manually inflate and leave overnight to check for leaks before leaving port on an overnight. Take at least one spare CO2 canister and one spare salt mechanism for the hydrostatic release. Ensure there is one tether for each crewmember, and three extra for double tethering while working the foredeck.
- Check pressure levels on all fire extinguishers.
- Check state and stowage of safety equipment on deck (e.g., MOB gear).
- Verify that flare kit is on board for overnight operations.
- Check that the medical kit is complete and stowed properly.
- Check that the correct EPIRB is on board. The boat's name will be on a sticker on the EPIRB.
- Inspect all compartments and stow all loose gear.
- Ensure that all items on the safety checklist are on board.

REPORT SAFETY CHECKS COMPLETE TO SKIPPER/COACH

3-2.4 ELECTRICAL SYSTEM ALIGNMENT

Disconnect from shorepower in the following sequence:

- Shut down all 120V AC circuits on the AC MAIN PANEL located below the DC panel
- Place 120V AC MAIN BREAKER, located abaft of the engine compartment, in the OFF position
- Disconnect the shore power cable from the pier end first, then the boat.
- Leave the cable on the pier for local sorties.
- Coil the cable and stow it below for point-to-point sorties.
- Check and record condition of battery banks using the DC meter system voltage scanner at the DC distribution panel
- The battery selector switches are located on the inboard face of the navigator's seat. Energize the engine electrical system by placing the engine start battery selector switch to the ON position.
- Place the house battery selector switch in the ON position.

Ensure the following switches are in the ON position at the DC distribution panel:

- ENGINE IGNITION

WARNING: ***THE ENGINE WILL NOT START UNLESS THE ENGINE IGNITION BREAKER IS TURNED ON, PLEASE NOTE THIS FOR EMERGENCY SITUATIONS.***

- ENGINE BLOWER

WARNING: ***THE ENGINE BLOWER MUST BE ON WHENEVER THE ENGINE IS RUNNING AND UNTIL 15 MINUTES AFTER SHUTDOWN TO HELP COOL THE ENGINE COMPARTMENT***

- VHF RADIO(set to Channel 82A)
- INSTRUMENTS
- NAVIGATION LIGHTS (as applicable)
- CABIN LIGHTS (as applicable)

3-2.5 ENGINE PRESTART CHECKS

Ensure that the engine log is onboard and that its checklist is in-hand to record the checks.

Before starting the engine, conduct the following inspections:

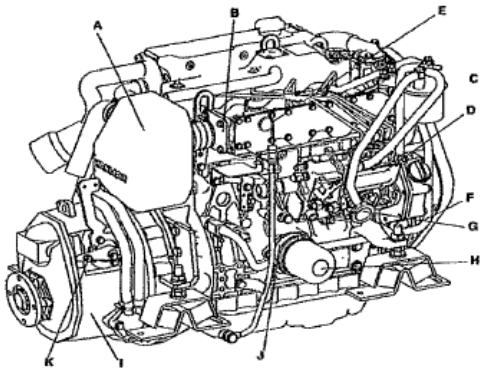
Visual Checks:

- Lubricating oil leakage from the engine.
- Fuel leakage from the fuel system.

- Water leakage from the cooling system.
- Damage to parts.
- Loosening or loss of bolts.

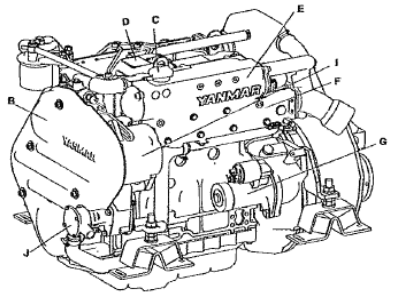
There are two models of Yanmar engines on the MK II. They are the 4JH4A on NA 21-25 and the 4JH4AE on NA 26-36. The only difference between the two models is the low pressure fuel supply system. The 4JH4A has a fuel lift pump lever on the starboard side, while the 4JH4AE has a push button fuel lift pump on top of the engine mounted fuel filter and an electric fuel pump.

Operation Side



A Intake silencer
B Intake manifold
C Fuel filter
D Fuel injection pump
E Dipstick
F Oil filler cap
G Fuel feed pump
H Lubricating oil filter
I Marine gear
J Oil cooler
K Shiftlever

Non Operation Side



B Belt cover
C Filler cap
D Engine nameplate (on the rocker arm cover)
E Coolant tank / Heat exchanger
F Exhaust manifold
G Starter motor
I Alternator
J Seawater pump

(B-Belt cover is removed to enable checking alternator belt tension)

Figure 3-1 Yanmar Engine Diagram

- Check the fuel level in the fuel tank to ensure there is sufficient fuel for operations.
- Check Engine Lubricating Oil level with the oil dipstick. If the oil level is low, add oil through the filler port to the top mark on the oil dipstick.
- Check the marine gear (transmission) oil level with the oil dipstick. If the oil level is low, add oil through the filler port to the top mark on the oil dipstick.
- Check that the coolant level is above the lower limit on the side of the coolant recovery tank. If the coolant level is close to the lower limit, remove the recovery tank cap and supply fresh coolant. If the coolant runs out too often, or only the coolant in the fresh water tank drops without any change in the water level of the coolant recovery tank, there may be some leakage of water or air. In such cases, inform maintenance personnel without delay. Coolant supplied with the boat is Yanmar Ultralife YG30 Allseason antifreeze coolant. Mixing coolant brands can damage the engine.

WARNING: Check the fresh water (coolant) level only while the engine is cold. The water rises in the coolant recovery tank during engine operation and the cooling water reading will be misleading due to thermal expansion. This is normal. After stopping the engine, the coolant cools and the extra coolant in the recovery tank returns to the coolant tank. Checking the water level while the engine is hot is also dangerous. Do not open the filler cap during operation or immediately after stopping the engine, because hot steam and water will spout out.

- Check the RACOR filter for evidence of water or excessive sludge in the sediment bowl and drain accumulated moisture/sediment as necessary.
- Check the throttle to ensure that the throttle lever moves smoothly before use.

- Check the seawater strainer, located in the compartment abaft the engine compartment. Use a flashlight. If the strainer holes can be seen it is clean. Do not open the housing if not needed. This will save the seals, and retain a positive seal. Clean if necessary.
- Ensure the engine seawater intake seacock is open. It's located below the seawater strainer to starboard abaft the engine compartment. Seacock is open when the lever is in line with the hose, as shown in Figure 3-2.

Figure 3-2 Engine Seawater Intake Seacock and Seawater Strainer

NOTE: The low oil pressure alarm will sound until the engine has started and oil pressure is established. See Chapter 4 - Maintenance

NOTE: If boat has just been launched, lift or pull aft the rubber seal around prop shaft log to purge air before starting. A small amount of water will come out as well. This only needs to be done when the boat has just been launched.

REPORT ENGINE PRE-START CHECKS COMPLETE TO THE SKIPPER/COACH
COMPLETE ALL ENTRIES IN THE ENGINE LOG

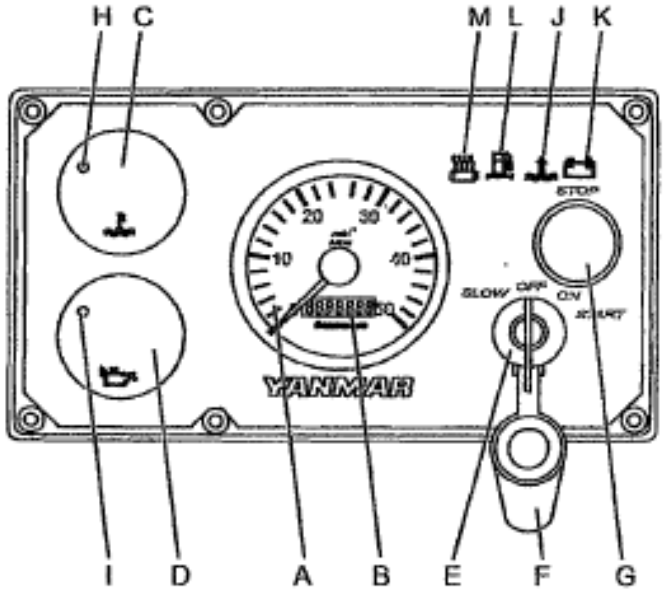
3-2.6 ENGINE STARTING PROCEDURES

- Engine Ignition and Engine Blower switches must be turned on at the DC panel in the navigation station.
- Pull clutch out to disengage (neutral). Safety equipment should make it impossible to start the engine in any other position than NEUTRAL
- Turn the key switch to **ON**.

NOTE: THE "GLOW PLUG" IS NOT INSTALLED ON ANY BOAT.

- If the alarm buzzer sounds and alarm lamps come on, the alarm devices are normal. The coolant high temperature alarm lamp should not come on.
- Turn the key switch to START, then release back to ON position once started. The key is spring loaded and will automatically return to ON once released.

WARNING: ***Turn the key for a MAXIMUM of 15 seconds in the start position. After the engine has started, the key should remain in the ON position. Alarm devices will not work when the key is in the OFF position***



A Tachometer
B Hour meter
C Coolant temperature gauge
D Engine oil pressure gauge
E Key switch
F Not installed (cap for key switch)
G Stop button switch
H Coolant high temperature indicator
I Engine oil low pressure indicator
J Not installed (sail drive seal water indicator)
K Battery low charge indicator
L Not installed (water in fuel filter indicator)
M Seawater insufficient flow indicator

Figure 3-3 Engine Instrument and Alarms Panel in Cockpit

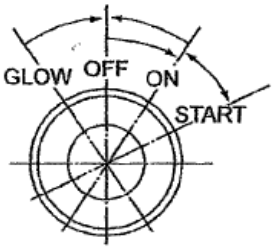
Instruments, equipment	Functions	
Key switch **Rotary switch with 4 positions**  	**OFF**	The switch key can be inserted or removed. All electric current is cut off.
	ON	The electric current to the controls and equipment is turned on. Engine keeps running. To stop the engine, the key switch should be in ON position. After stopping the engine, please turn OFF the key switch.
	START	The start position of the engine. The electric current to the starting motor is turned on. When you release the key, it will automatically turn to ON position.
	GLOW	The start aid position of the engine. The electric current to the air heater /glow plug is turned on. When you release the key, it will automatically turn to ON position. JH4 series: Air heater is an option.
	Note: When you don't use the engine, please remove the key from the key switch and cover the keyhole with the cap to protect from corrosion.	
Stop button switch	Push button switch to stop the engine. The electric current to the stop solenoid is turned on.	

Figure 3-4 Engine Switch Panel

Figure 3-5 Engine Morse MV2 Throttle NA 21-34

Silver knob is clutch, pull out to disengage, push in to engage. Throttle must be in neutral or clutch disengaged to start engine. To engage throttle in gear, push in clutch, pull up on semi-circular ring under knob at top and push forward on handle to go in forward. Push handle aft to go in reverse. Neutral is achieved when the handle is straight up. Pause in idle when switching between forward and reverse while clutch is engaged.

Figure 3-6 Engine Teleflex Throttle NA 35-36

Black round knob in bottom of throttle handle is clutch and neutral safety. Throttle must be in neutral or clutch disengaged (knob pushed in) to start engine. To engage throttle in gear, ensure knob is in the out

position, pull up on semi-circular ring under knob at top of throttle and push forward to go in forward. Push handle aft to go in reverse. Neutral is achieved when the handle is straight up. Pause in neutral (idle) when switching between forward in reverse when the clutch is engaged.

- If the engine does not start the first time, wait for about 15 seconds before trying again.
- ***Before turning the key switch again, be sure to confirm that the engine has stopped completely. If the engine is re-started while the engine still has not stopped, the pinion gear of the starter motor will be damaged. If several attempts fail, consider the following possibilities:***
    - ***Excess back pressure caused by water in the muffler (see Chapter 4)***
    - ***Air in the fuel lines (see Chapter 4)***
- After the engine starts, immediately check for seawater flow through exhaust port on transom.
- Check that panel instrumentation is functioning properly.
- Check oil pressure. Shut down engine if normal oil pressure (8-78 psi) does not show on gauge immediately after starting or if low oil pressure alarm sounds.
- If oil has just been changed, stop engine and check oil level in crankcase after allowing a few minutes for oil to drain back into the crankcase.
- Check that voltage meter reads 12-14 volts after batteries have been recharged. If voltmeter shows abnormal values, the engine should be stopped and the cause investigated.
- Never turn off battery switch with engine running as this will damage the alternator.
- Check tachometer idle RPM. (600-800 rpm range).
- Advance the throttle to a fast idle position (1,200 to 1,500 rpm). Check instrument panel gauges for proper engine operation.
- After operating engine temperatures have been achieved, return the throttle lever to the idle position.
- Check the operation of the propeller by:
    - Return the throttle to idle
    - Push the knob beside the throttle **IN**.
    - Move the throttle forward and observe that forward propulsion occurs
    - Return throttle to neutral and pull into reverse to check for backward propulsion
    - Return throttle to idle in neutral.
- Record readings in engine log.
- Check engine operating temperatures periodically during operation. ***Do not rely totally on alarm systems – check gauges***.

REPORT SUCCESSFUL ENGINE START TO SKIPPER/COACH

3-2.7 STOPPING THE ENGINE:

WARNING: ***NEVER stop the engine immediately after high-speed operation, except as required in an emergency situation. Elevated engine temperatures caused by high speed operation should be allowed to drop before stopping engine. It is important that the engine is allowed to idle for a while after high-speed operation. Check the temperature gauges to verify that the engine has cooled to 160^{o}-180^{o} F before shutting it down.***

WARNING: ***THE ENGINE BLOWER MUST BE <u>ON</u> UNTIL 15 MINUTES AFTER SHUTDOWN TO HELP COOL THE ENGINE***

- Once engine has cooled, push the black **STOP** button on engine panel.
- Turn engine ignition switch to **OFF** position.
- The ***emergency*** stop (pull lever) is located in close proximity to the engine control panel. This method of stopping is for emergency use only.

REPORT ENGINE SHUT DOWN COMPLETE TO THE SKIPPER/COACH

3-2.8 SAIL INVENTORY

Ensure that the sails required to support the planned sortie are on board. See Table 3-1 Sail Management.

REPORT SAIL INVENTORY COMPLETE TO SKIPPER/COACH

3-2.9 COMMUNICATION/NAVIGATION (COM/NAV) EQUIPMENT CHECKS

NOTE: Shore power may be maintained during electrical equipment warm-up when the auxiliary diesel engine is not operating to avoid drawing down the House battery bank prior to getting underway.

- Test operation of the following COM/NAV units for day/local sorties:
  - VHF radio
  - Instruments
  - Navigation and steaming lights if required
- Ensure that charts, publications, and schedules required for the sortie are onboard.
- Shut down unnecessary COM/NAV equipment.

REPORT COM/NAV CHECKS COMPLETE TO SKIPPER/COACH

3-2.10 PRE-SAILING BRIEFING

Whether embarking on local operations or for an extended passage, a pre-sailing briefing ensures that the crew is familiar with planned evolutions, required equipment is onboard, and proper skill levels are represented in the crew. The briefing guide below is the minimum information to be disseminated to the crew before sailing.

- Mission
  - Primary - be as specific as possible.
  - Secondary - be specific.
  - Operating Area – define.
  - Departure and return times.
  - Where the boat will land.
- Crew assignments for the sortie.
- Sail configurations required or intended for the sortie depending on the weather.
- Communications.
  - With whom.
  - Frequencies/channels to be monitored.
  - Time.
- Weather for the operating area or route and for point to point sorties.
  - Existing.
  - Forecast.
  - Destination.
- Route
  - Check Points.
  - Potential Problem Areas.
- Navigation
- Emergency procedures review: Brief at least one procedure at the beginning of each sortie.

3-3 UNDERWAY PROCEDURES

This section includes procedures for underway evolutions. They are presented in the order they most often occur during a sortie. Since the normal underway procedure includes the use of the engine, it is covered first.

3-3.1 OPERATING UNDER POWER

Once the engine is started, the helmsman can maneuver the vessel by shifting into forward and reverse. Throttle is adjusted using the Morse MV2 throttle located on the side of cockpit to starboard.

While operating under power, maintain engine RPM at cruising speed of 2800 RPM or lower for the Yanmar engines. Use full throttle (3000 RPM) only for short bursts or as required for emergencies. The engine will get best fuel economy running at 2400-2500, and still operate at approximately 6 knots, depending on the sea state. Do not operate the engine if the boat's heel is greater than 20 degrees. Each MK II is equipped with an inclinometer installed on the cabin overhead amidships between the galley and navigation station.

3-3.2 DEPARTURE

These procedures will vary according to the configuration of the slip, dock, or mooring.

3-3.2.1 TYPICAL SLIP DEPARTURE

- Follow the AC disconnect procedures in 3-2.4
- Ensure that all personnel are onboard and assign crew to “Stand by your lines”.
- Order crew to “Take lines in hand” and bring vessel to windward side of slip if necessary.
- Check for lines overboard
- At Santee Basin, request permission from Santee Basin Control via VHF 82A to exit the basin
- Selectively CAST OFF or TAKE IN LINES as necessary for departure.

NOTE: Depending on number of crew, departure procedures under power call for crew to take lines in hand by leading lines outside the lifelines and preparing to cast off.

- When backing out of a slip, select REVERSE on the throttle, and report “Backing”. Use throttle bursts, then idle down in gear to minimize twist of stern to port.

NOTE: The NAVY 44 is typical of a single right hand screw vessel. It will back to port. The propeller shaft is offset to starboard to minimize this tendency.

- Hold the bow lines to control the boat orientation in the slip until no longer needed then toss them to the quay or take them in.
- Walk the spring and stern lines forward to the widest part of the boat to maintain control of boat orientation. Then take them in or drape them on the pilings for access upon return.

3-3.2.2 TYPICAL DOCKSIDE DEPARTURE

- Follow the AC disconnect procedures found in 3-2.4
- Ensure that all personnel are onboard except for those required to cast off or take in lines from the dock.
- Normal procedure is a departure under engine.
- Make the appropriate signal.
- Hold a spring line and operate the engine to work against this line. This will warp the boat out from the dock. Aft spring, engine in reverse for warping the bow away from the dock. Forward spring, engine in forward to warp stern away from the dock.
- Operate the engine in the direction required for the departure.

3-3.2.3 TYPICAL MOORING DEPARTURE

Unless there is a strong current opposing the direction of the wind, the NAVY 44 is most likely to respond to the wind. Departing a mooring under sail is therefore an option.

- Ensure that all personnel are onboard.
- Single-up the mooring pennant if applicable.
- Normal procedure is a departure under engine. Hoist sails if a departure under sail is to be accomplished.
- Make the appropriate signal. Cast off the mooring.
- Operate the engine in reverse to back off from the mooring OR back the jib to throw the bow to one side of the mooring to clear.
- Operate the engine in forward to clear OR sheet the jib properly and sail away.

3-3.2.4 ENGINE SHUTDOWN PROCEDURE UNDER SAIL

These procedures will ensure the propeller is properly feathered.

- Ensure that the engine is operating in forward propulsion. The prop will not feather with the engine operating in reverse.
- Operate engine to get 2 to 3 knots in forward gear.
- Secure the engine with the “STOP” button while still in forward gear.
- If the shaft is still spinning, engage the transmission in reverse to stop the freewheeling.
- Take the engine out of gear. If the prop has not feathered, the shaft will continue to freewheel like with a fixed blade propeller. In this case start the engine and repeat steps 1 through 3.

- The engine can be left either in or out of gear after the propeller is feathered.

REPORT ENGINE SHUT DOWN COMPLETE TO THE SKIPPER/COACH

3-3.3 LOGS AND LOG KEEPING

Refer to applicable procedures. References include:

- DNAS INST 3120.1E - Standard Operating Procedures (SOP)
- DNAS OPORD 201- Current year OPORD

3-3.4 OPERATING UNDER SAIL

It is not the purpose of this document to teach an individual how to sail. Basic sailing terms and maneuvers are covered from the view point of how they can be accomplished in the NAVY 44. The procedures listed here describe the requirements to execute a maneuver and are not offered as the ONLY way to accomplish the action, rather are the result of many hours of training novice sailors, and represent a point of departure. Organization of this section is as follows:

Sailing Terminology
Commands
Optimal Boat Performance
Procedures for "Bending On" Sails
Maneuvering under Sail

- Sail Trim
- Hoisting Sails
- Tacking and Gybing
- Headsail Changes
- Spinnaker

Heavy Weather Sails (Storm Jib and Storm Trysail) are covered in Chapter 6, Special Operations.

3-3.4.1 SAILING TERMINOLOGY

TACKING: A turn moving the bow through the wind so that the mainsail boom passes from one side of the boat to the other.
HARDENING UP: A maneuver that moves the bow of the boat toward the wind-but does not tack.
CLOSE HAULED: Sailing the boat as close to the wind as possible.
GYBING: A turn that moves the stern through the wind so that the mainsail boom passes from one side of the boat to the other.
BEARING AWAY: A maneuver that moves the bow away from the wind, but that does not gybe.

3-3.4.2 COMMANDS

The following are "defined words" that specify a particular action. They have been chosen to avoid confusion.
TRIM: To trim a sail means to check its shape or angle to the wind and adjust as necessary.
EASE: To let out a sail, line or halyard; also to turn the boat away from the wind. Hand signal is rotating the index finger pointing down.
TAKE: To take in on a sail, line. Hand signal for a halyard is rotating the index finger up
TENSION: Load, as on a halyard, sheet or backstay. This is preferred to, "take in the slack", because if only the last part of the command is heard, an improper action will be accomplished.
HOLD: Temporarily stop what you are doing, such as grinding on a winch, also a steering command as in “Hold your course”. Hand signal is a fist.
MADE: Indicates that a connection has been “made”, as in a shackle or halyard is secured, the connection of the new guy has been “made” to the spinnaker pole when gybing.
HIGH: Indicates that a sail is fully raised and the luff properly tensioned.

3-3.4.3 OPTIMAL BOAT PERFORMANCE

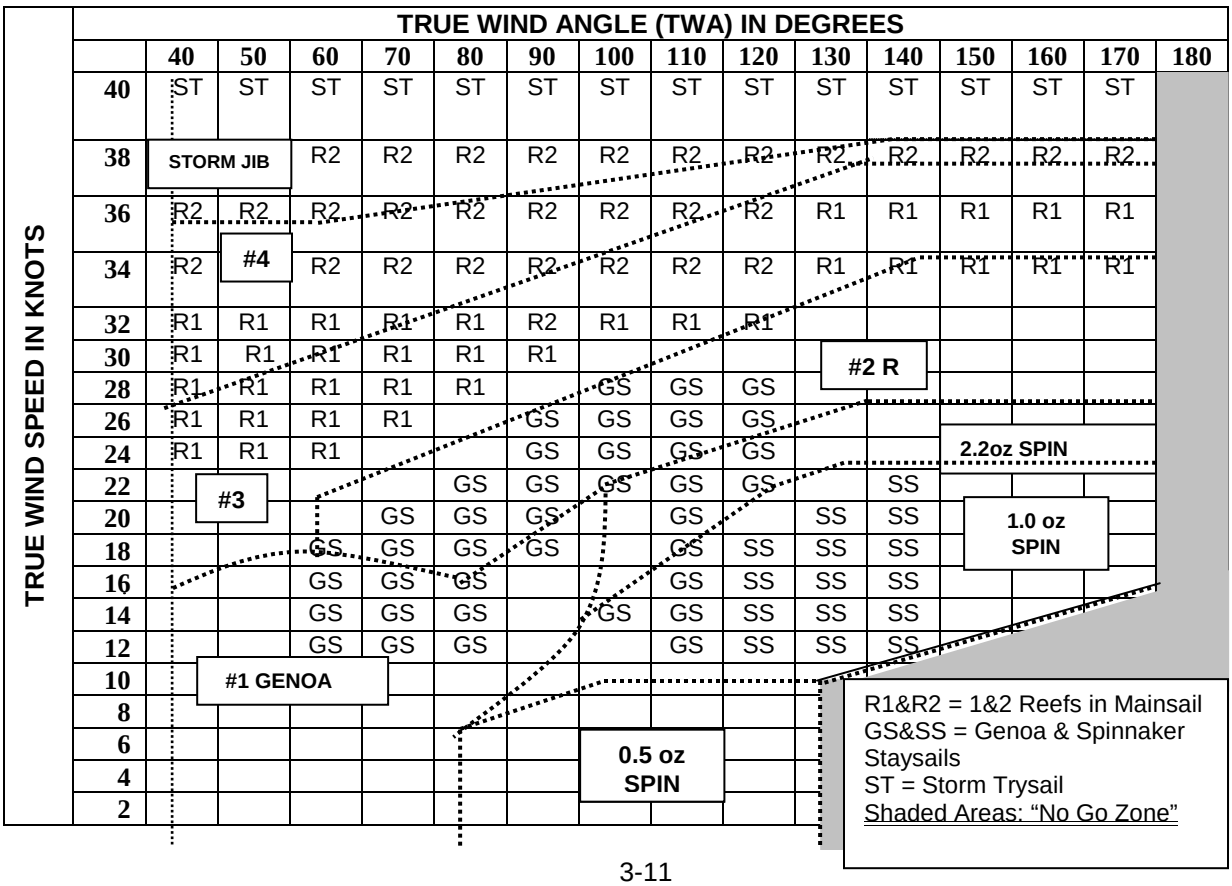
Factors that will improve performance are:

- Trim sails for maximum efficiency so as to harness the power of the wind.

Table 3-1 Sail Selection Management Chart

SAIL	APPARENT WIND SPEED	SHEETING POSITION	MAIN SAIL
# 1 GENOA	0 - 15	Adjust genoa cars for optimum trim	FULL
# 2 GENOA HIGH CLEW REACHER	0 - 15 15 -18	Snatch block on toe rail for optimum sailing angle trim	FULL
GENOA STAYSAIL	0 - 12 12- 25	Fwd cars adjusted for optimum trim	FULL 1ST REEF
#3 WORKING JIB	16 - 22 22 - 25 25 - 30	Fwd cars adjusted for optimum trim	FULL 1ST REEF 2ND REEF
#4 HEAVY WX JIB	30 - 35	Fwd cars adjusted for optimum trim	2ND REEF
STORM JIB	35+	Snatch block at max girth toe rail aft of stanchion	2ND REEF OR STORM TRYSAIL
STORM TRYSAIL	35 +	Spreacher blocks	TRIM BOTH SHEETS SIMULTANEOUSLY

Table 3-2 Recommended Racing (Advanced) Sail Selection Cross Over Chart



3-3.4.4 BENDING ON SAILS

3-3.4.4.1 MAINSAIL

1. Attach the tack cringle to the gooseneck with the clevis pin provided on the boom.
2. Attach the clew to the outhaul car with a clevis pin. See Figure 3-6
3. Attach the head of the sail to the headboard sail slide; this slide is permanently attached to the mast.
4. Remove the sail slide stop on the mast and feed the remaining sail slides of the luff onto the mast track.
5. Replace the sail slide stop.
6. Rig the “first reef” line at the end of the boom through the “first reef” cringle on the leech of the sail.
7. Bring the line straight down, pass it between the foot of the sail and the boom, then down around the boom and back up.
8. Tie the end of the line around the standing part with either a Bowline or Timber Hitch. See figure 3-7 How to Tie a Reef Line.
9. Flake the sail on the boom, secure it in place with sail ties, and put on the sail cover.
10. Rigging the cunningham is easier to accomplish after the main is hoisted. Lead the line through the lower cringle on the luff of the mainsail. Attach the eye splice to the reefing horn on the boom. The tail of the cunningham is lead through a four part block and tackle below the boom and exits through a cam cleat.

Figure 3-7 Outhaul Attachment

3-3.4.4.2 JIB/GENOA WITH HANK-ON ATTACHMENT

1. Select the desired sail depending on the wind/sea conditions. See table 3-1. Sail Management.
2. Bring the sail up on the foredeck and place near the forward lower shrouds.
3. Roll the sail toward the forestay taking care not to let the sail fill in the wind and go overboard.
4. Attach the tack to one of the two snap shackles at the stem fitting. This will leave the second one open for a sail change.
5. Hank on the luff hanks, (all pistons to the same side), to the headstay taking care not to twist the sail.
6. Attach the jib sheets to the clew cringle with a bowline. Lead the sheets to the proper track fairleads and to the corresponding winches in the cockpit. Genoas lead outside the shrouds. Jib sheets lead outside the forward lower shrouds and inside the upper and aft lower shrouds.
7. Tie a figure eight stopper knot in the tail of the sheet.
8. Attach the desired jib halyard to the head of the sail.

3-3.4.4.3 GENOA STAYSAIL

The genoa staysail is hanked on the collapsible inner forestay. The topping lift, (T-Lift), is used as the halyard. Sheets are led the same as for a #3 or #4 jib for upwind, outboard of the forward lower shroud, inboard of the upper shroud and the aft lower shroud.

1. Set up and tension the collapsible inner forestay.
2. Set windward running backstay.
3. Bring the sail onto the foredeck and place where it won’t fall overboard. Remove the sail from the bag.
4. Roll the sail toward the collapsible inner forestay taking care not to let the sail fill in the wind.
5. Attach the tack to the swivel snapshackle at the base of the collapsible inner forestay.
6. Hank on and work up the luff.
7. Run sheets as for a #3 headsail.
8. Attach the T-lift to the head of the sail after making sure it is not wrapped around the inner forestay.

9. Hoist the sail.
10. Trim the sail.
11. Adjust the control blocks as necessary for the wind condition.
12. Adjust the running backstays as necessary.

3-3.4.5 SAIL TRIM

3-3.4.5.1 JIB TRIM

In order to derive full power potential from the sails, they should be trimmed to best advantage. The following is offered as helpful hints to approach optimum trim.

- To select the correct sail for the conditions, note the wind velocity and check the sail management table below.
- Check the lower set of telltales in the luff of the sail. Both the inside and outside telltales should be streaming. The inside telltale will probably be at a higher angle than the outside telltale.
  a. If the sail is trimmed all the way in and the inside telltale is floating, you are “light”, or “pinching”, (not as much pressure in the sail as should be), sailing too close to the wind. Bear off, away from the wind, until the telltales are parallel.
  b. If the outside telltale is floating you are "fat", (too far away from the wind for the trim of the jib). Either bring the boat up toward the wind until both telltales are streaming, or maintain heading and ease sails until the telltales are in trim
- Check the higher set of telltales against the lower telltales. Slowly bring the boat toward the wind and note which set breaks first.
  a. If the higher set breaks first, the sail needs more leech tension, (the upper portion of the sail is too loose and at a greater angle of attack than the lower portion). Move the lead block forward on the genoa track.
  b. If the lower set breaks first, the sail needs more foot tension, (to close up the lower portion of the sail). Move the lead block aft on the genoa track.

3-3.4.5.2 MAINSAIL TRIM

The sail has been cut by the sailmaker to create an airfoil shape. Improper trim can effectively distort this airfoil. The most common tendency is to “over trim”. Use the memory crutch - “When in doubt, let it out”. This helps to ensure that the sail is not over trimmed. The two controls that are used to control the positioning of the mainsail are the sheet and the traveler.

- For gross adjustments the sheet is used to control all movement of the boom, (in and out, as well as up and down). When making the final fine adjustments the sheet is used to control the “up and down” movement of the boom or twist. Easing the sheet will induce more twist and effectively de-powers the sail by spilling more air in the upper portion of the sail. The mainsail can also be de-powered by flattening the mainsail by use of halyard tension, outhaul, backstay tension and cunningham.
- The boom vang can be used to “lock in” the desired position and ensure that it will be replicated when the boat is tacked or the mainsail eased. The traveler is used to control the mainsail angle of attack to the wind.
- Check the luff area of the sail. It should be firm or “breathing” slightly in heavier air. "When in doubt, let it out". The sail should be “let out” with the sheet and or traveler until the sail stalls, (a distortion of the sail shape will occur just aft of the luff called “luffing”). Trim to stop the “luffing”.
- There are telltales at the leech ends of the batten pockets. They give an indication of the wind flow where the windward and leeward airstream meet at the leech of the sail.
  a. If the telltales are all falling way to leeward, the sail is over trimmed, (too close to the centerline of the boat). “When in doubt-let it out”. Ease the sheet until the telltales stream straight aft from the leech. At reaching sailing angles, the upper mainsail telltale may stall part of the time.
  b. If the telltales are floating, or hooking to windward, the sail is too far away from the centerline of the boat. Bring in the sail until the telltales stream straight aft from the leech. Fine adjustments can then be made. Trim in the sail until the top telltale does not stream anymore, and then ease the sail out until the top telltale just starts to stream aft.
- Check the telltales in the draft of the sail. If the inside telltale is floating, the draft is probably too far aft in the sail. Increase cunningham tension. The fattest part of the airfoil, (camber), should be between one quarter and one half of the length of the sail at that point, (chord). Check the draft stripes to observe the curvature of the airfoil.
- The mainsail affects the helm forces on the steering wheel. The center of effort of the mainsail is aft of the center of lateral resistance. If the mainsail is trimmed too tight this will cause the boat to heel excessively

and “round up” toward the wind. This is called “weather helm”, and excessive pressure on the wheel will be required to steer a straight course. As the boat heels over, the center of lateral resistance moves forward due to the increased size of the leeward bow wave. The center of effort of the sail plan must also move forward to counter the shift in lateral resistance. A “heavy helm” can be trimmed out by easing the mainsail. Adjusting the mainsail in the following ways can keep the boat’s helm in balance.

- Ease the mainsheet traveler control line.
- Ease the mainsheet.
- Ease the boom vang.
- Reef the mainsail.

3-3.4.5.2.1 RUNNING BACKSTAYS

The running backstays (runners) can be used as checkstays to straighten the mast for optimum sail trim while racing. To use the backstays:

a. Free up the running backstay. Ensure there is a fair lead back from the mast.
b. Locate the runner tail (an additional length of line with a snap shackle at the end of it). Attach the runner tail with the snap shackle to the eye splice on the end of the running backstay.
c. Lead the runner tail to a snatch block rigged to the toe rail between the primary and mainsheet winches, then to the primary winch.
d. Tie a stopper knot in the end of the runner tail.
e. Add reasonable tension, not heavy, to the windward running backstay with the winch and secure the line in the self-tailer.
f. When tacking, release the loaded running backstay as the boat comes through the wind.
g. Load and tension the new windward backstay before the sails fill and put a load on the mast.

3-3.4.6 TACKING THE NAVY 44 - CLOSE HAULED TO CLOSE HAULED

Safety Considerations:

- Ensure jib/Genoa sheets are clear both in the cockpit and forward.
- Ensure intended course is clear of other boats, shipping, and navigation hazards.
- Ensure crew members are alerted to the maneuver and in “safe zones” for the maneuver.

General Situation:

- Assume going upwind in moderate conditions.
- Required Positions:
- HELM (steers the boat).
- GRINDER (grinds the winch to take in the new sheet).
- TAILER (works the tail of the new sheet).
- WORKING SHEET. This person can double as Grinder after casting off.

Sequence of Events:

1. HELM calls out "Ready About". Crew members take assigned positions. If known**,** HELM lets crew know what point of sail they should trim to on the new tack.
2. TAILER places sufficient turns for wind conditions on the windward winch, takes the slack out of the lazy sheet, and stands in the cockpit. Discusses with GRINDER whether they have all the turns needed or will be putting more on before the winch handle is inserted. Reports "Ready" to HELM
3. GRINDER gets double handled winch handle, and stands forward of the windward winch facing aft with one foot against the toe rail and the other in the cockpit. Reports "Ready" to Helm
4. WORKING SHEET uncleats the leeward sheet, removes excess turns from the leeward winch. Reports "Ready" to HELM.
5. After receiving "Ready" reports from crew, HELM calls out "Helm's-a-lee”.
6. WORKING SHEET, as the boat comes into the wind, watches the luff of the jib or genoa and as it begins to luff, stands up on the seat and takes the turns off the winch. Once the turns are off, watches the sheet go through the block ensuring it does not foul.
7. TAILER, as the old sheet is cast off, tails as hard and fast as possible, taking more turns on the winch as needed.
8. GRINDER asks if TAILER has the required turns, inserts handle and commences grinding in the high speed direction as soon as the working sheet is cast off. Switches to low speed when the load becomes great and completes the trim of the jib
9. TAILER keeps tension on the sheet and once GRINDER switches to low speed, sits on the cockpit seat facing forward. Watches to see the trim of the genoa/jib and that the sail is clear of the spreader

to tell GRINDER when to stop.

10. HELM communicates with Trimmers to determine exact trim and whether HELM wants to point or reach.

HELPFUL HINTS AND COORDINATION:

- HELM can overshoot the desired new close hauled course slightly so that the boat will match the jib trim position and the jib will start to drive the boat sooner in the turn.
- As GRINDER brings in the jib trim, HELM can pace wheel movement to come up to new course. Calls "Course" when arrives at new course
- Communications is required between TAILER and HELM to determine exact trim and whether HELM wants to "point" or “foot”.
- Mainsheet trimmer trims to match the "overshoot” position and adjusts the main to “point” or “foot” as boat speed is gained on the new tack.

3-3.4.7 GYBING

WARNING: ***The gybe is a potentially dangerous maneuver. The mainsheet and boom can exert deadly force. Crew coordination is vital. Crew must take care to keep their heads down below boom level, and stay clear of the mainsheet as it arcs through the cockpit area.***

Safety Considerations:

- Ensure Jib/Genoa sheets are clear both in the cockpit and forward.
- Ensure mainsheet tail is clear.
- Check to ensure intended course is clear of other boats, shipping, and navigation hazards.
- DO NOT allow boom to gybe without trimming to centerline, even in light wind.
- HELM is in charge and in control of the evolution. HELM must be cognizant of the respective jobs and chronology. Specifically, HELM should time the rate of turn. He should not cross the wind until the mainsail is centerline. He can slow down or speed up the gybe for a smooth, safe gybe.
- If the coordination is not going right, HELM should slow or stop the turn until everyone is in sync.

General Situation:
The description below starts with the boat on a broad reach aiming to arrive at a broad reach on the other tack.
Required Positions:

- HELM.
- GRINDER.(grinds the winch to take in the new sheet).
- TAILER (works the tail of the new sheet).
- WORKING SHEET This person can double as GRINDER.
- MAINSHEET.
- PREVENTER.
- This can be an added responsibility of GRINDER, TAILER, or WORKING SHEET.
- Depending on conditions, one person may be WORKING SHEET, TAILER, PREVENTER and GRINDER.

NOTE: ***A PREVENTER is a safety device used to guard against an accidental gybe. It will be used anytime the wind is at a greater angle than 120 degrees either side of the bow. It should be rigged prior to the gybe maneuver. For rigging procedures and crew deployment requirements see Chapter 1, The Preventer System 1-5.9.***

Sequence of Events:

1. HELM calls out "Prepare to gybe" and lets crew know what point of sail they should trim to upon completion of the gybe
2. PREVENTER eases the loaded side of the preventer. and reports, "Preventer is clear" to HELM
3. MAINSHEET takes sheet out of the self- tailing winch and removes excess turns from winch, checks the positions for the traveler, and that both ends of the traveler control line are cleated. He then reports "Ready Mainsheet" to HELM.
4. WORKING SHEET uncleats sheet, removes excess turns from the winch, ensures sheet is clear to run, stands in cockpit, and reports "Ready" to HELM
5. TAILER places one or two turns on the winch, makes the sheet snug, and reports "Ready to HELM

6. GRINDER gets double handled winch handle, stands by the lazy sheet winch, and reports "Ready" to HELM.
7. After receiving "Ready" reports from crew, HELM calls out "Bearing Away" and turns the stern toward the wind
8. MAINSHEET and WORKING SHEET ease sail to maintain trim. TAILER keeps taking on the sheet to minimize slack.
9. When wind reaches 150-160 degrees apparent, MAINSHEET trims the mainsail, timing it so that the main is amidships before the boat is dead downwind. An extra crew member can help with the trim by taking in on the other mainsheet winch. The designated crew for PREVENTER takes “line in hand” on the “new” side of the preventer.
10. HELM calls, "Gybe HO!" as the stern passes through the wind, and the boom is crossed to the other side of the boat.
11. WORKING SHEET eases, then casts off the sheet as the TAILER trims the new sheet to the expected point of sail.
12. MAINSHEET eases the main to the expected point of sail.
13. If sailing with wind abaft 120 degrees apparent, PREVENTER resets the preventer.

3-3.4.8 CHANGING A HEADSAIL - HANK ON JIB/GENOA

There are three basic sail change situations that will vary the sequence and rapidity of the change. Each has its appropriate place. The hank on boat will be "bald headed" while the change is made. A change can be made by:

- Changing tacks.
- Maintaining the same point of sail.
- Bearing away to sail off the wind. (This is a smart consideration during heavy weather).

The “tack change” is typically used in restricted waters situations when there is an urgency to complete the evolution. Changing while remaining on the same tack is useful when on a long passage, when there is more time and/or, there is no room to tack. Finally, a change wherein the boat bears away until the wind is abaft the beam to reduce pitching and water coming on deck is best in more severe conditions at sea with plenty of sea room.

3-3.4.8.1 TACK CHANGE

Safety Considerations:

- Depending on time of day and prevailing conditions, harnesses may be required.
- Talk through the evolution so the crew understands each person's responsibilities.
- Check the area for other boats, shipping, and navigation hazards which might impact the timing of the evolution.

General Situation:

Assume going upwind in moderate conditions and changing from a larger to a smaller headsail.

Required Positions:

- HELM.
- GENOA SHEET
- FOREDECK #1 (boss of the foredeck).
- FOREDECK #2
- MAST

NOTE: ***A MAINSAILTRIMMER may be assigned for the tack; however, it isn't imperative that the sheet and/or traveler be adjusted.***

Sequence of Events:

1. HELM announces what type of change and what sail will be raised: "Standby to change to the #3, this will be a tack change". HELM also assigns crew positions and indicates whether the new sail will be brought on deck through the forward hatch (normal route), or through the companionway (taking weather into account).GENOA SHEET using either the lazy sheet or a changing sheet sets the new lead position and leads the new sheet to the foredeck; reports "New Lead Made”
2. FOREDECK #1 and 2 bring new sail on deck, remove it from the bag, unroll it toward the forestay, and hank on the new sail on the weather side of the headstay below the first hank of the sail already set. Attach the new Genoa/jib sheet ensuring it is properly led and that the sheet is clear. Report **“**Ready“ to HELM.

3. MAST readies the working jib halyard for release by taking the halyard out of the self-tailer and checking for knots and tangles. Removes excess turns from the winch. Reports "Ready" to HELM.
4. After receiving "Ready" reports from crew, HELM calls out "Tacking, change to the #3" and turns the boat into and through the wind.
5. GENOA SHEET casts off when appropriate and stands by to trim the new sail.
6. MAST watches for the boat to come up, and for the genoa sheet to be eased, then begins to lower the halyard. Removes excess turns as the load decreases but leaves at least one turn on the winch.
7. FOREDECK #1 un-hanks the sail as it comes down the headstay. Once the sail is un-hanked, changes the halyard to the new sail and calls "Made" to MAST.
8. FOREDECK #2 gathers the sail as it comes down and pulls it aft and to weather. Crew on the rail hold sail. After sail is down, moves aft to help MAST hoist the new sail.
9. MAST when halyard is shifted to new sail, hoists the sail. When hoisted, calls "HIGH" to GENOA SHEET. Makes up tail and secures it.
10. GENOA SHEET when "HIGH" call is received trims to course.
11. FOREDECK 1 and 2 re-lead lazy sheet to new sail. Fold, bag, and stow old sail.

NOTE: ***Under most conditions it is not prudent to leave a sail on deck for a prolonged period (whether bagged, hanked, or lashed). Consider rolling smaller headsails from the "hanks to the clew" so that in heavy weather when the sail is brought on deck it can be taken out of the bag at the shrouds and unrolled forward. This becomes a single person job as opposed to a two person job.***

3-3.4.8.2 SAME TACK

The same procedures apply as for CHANGING ON A TACK. Omit the tack in Step 5.

3-3.4.8.3 BEARING AWAY

The same procedures apply as for changing on SAME TACK. Amend step 5 to "Bear Away" to a comfortable point of sail as determined by wind and sea conditions.

3-3.4.9 REEFING THE MAINSAIL

As the wind strength increases and the headsail is changed down to a smaller sail, the size of the mainsail can be reduced through reefing in order to keep from overpowering the boat.
Safety Considerations:

- When wind/weather conditions require a reef, harnesses may also be required.
- Avoid stepping in the bight of the main halyard.
- Ensure personnel remain clear of the boom and mainsheet tackle to prevent injuries from erratic movements.
- This evolution requires constant communications.

General Situation:
Assume sailing on a beam reach or closer to the wind in moderate to heavy conditions.
Required Positions:

- HELM
- MAST
- MAIN HALYARD
- MAINSHEET
- REEFING LINE

Sequence of Events:

1. HELM calls out "Prepare to reef" and crew takes positions.
2. MAST checks mast ensuring sail slides are free to run and reefing hooks are free. Takes position on the windward side of the mast and reports" Ready Mast" to HELM.
3. MAIN HALYARD ensures halyard is clear to run, removes halyard from the self tailer, removes excess turns from the winch, puts balance of halyard aft, and reports "Ready Halyard" to HELM.

NOTE: ***If the second reef is being set, ensure that the first reef line clutch in the boom is set before the line for first reef is taken off the winch.***

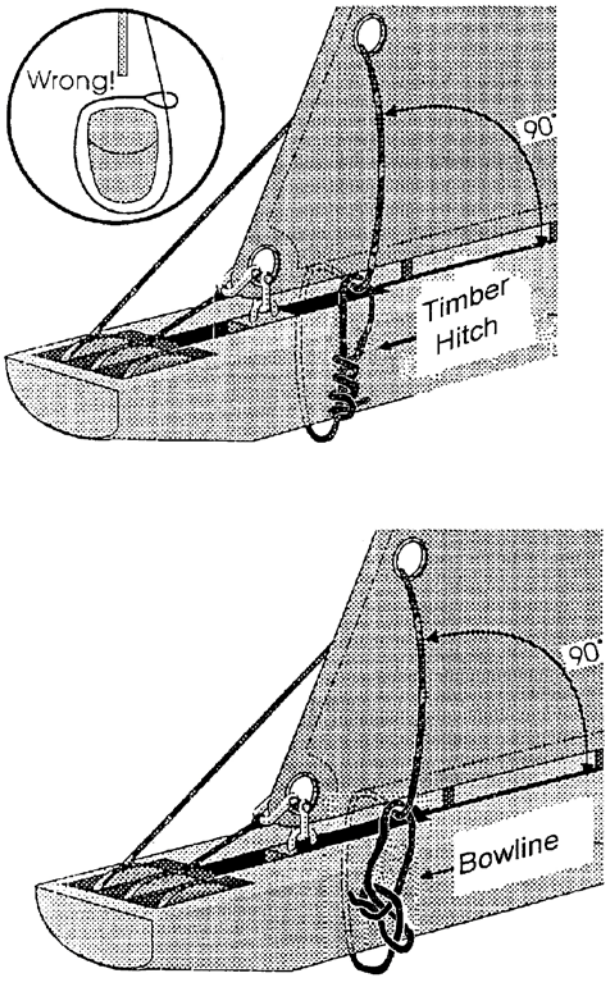


Figure 3-8 How to Tie a Reef Line

4. REEFING LINE ensures the correct reef line is led fair and places necessary wraps on winch. Ensures that the reef lines are tied in correctly at the correct places. Reports "Ready" to HELM.
5. MAINSHEET ensures vang and sheet are clear to run, takes position facing the main and reports "Ready" to HELM.
6. Receiving "Ready" reports, HELM calls out "Take the reef" and maintains course, anticipating the boat's tendency to bear away once the main is eased.
7. MAINSHEET eases sheet until sail luffs and eases vang.
8. MAIN HALYARD eases halyard as the sheet is eased. DO NOT remove turns from the winch since the halyard will be tensioned again after the reef in made.
9. MAST assists sail slides down the track, puts reefing cringle onto the reefing hook, and calls out "Made".
10. MAIN HALYARD trims halyard after hearing "Made". Works with MAST to watch luff tension as halyard is ground in.
11. REEFING LINE takes in on reefing line as the halyard is eased. As soon as he hears “Made" from MAST, trims the reefing line, listening to MAINSHEET for when to stop
12. MAST ensures that the cringle stays on the reefing hook. Communication with MAIN HALYARD about whether halyard needs easing or trimming is critical.
13. MAINSHEET directs REEFING LINE to grind until the clew is snug against the boom and under tension.
14. Once halyard and reefing line are trimmed, MAINSHEET trims sheet and vang.
15. MAIN HALYARD and REEFING LINE make off and coil respective lines.
16. Excess sail cloth is pulled to windward, rolled, and tied with sail ties reeved through the reef points and between the foot and the boom. (Use a slippery reef knot).

Helpful Hints:

- ***If the reef will be in place for a while, tie a sail tie "earring" through the new clew and around the boom as a safety measure.***
- ***If conditions are worsening and a second reef is anticipated, put the stopper on the first reefing line and rig second reefing line.***
- ***The reefing lines are color coded. 1st reef has a GREEN TICK, (STBD side of mast). 2nd reef has a RED TICK, (PORT side of the mast).***

3-3.4.9.1 SHAKING A REEF

Safety Considerations:

- Avoid stepping in the bight of the main halyard.
- Ensure personnel remain clear of the boom and mainsheet tackle to prevent injuries from erratic movements.
- This evolution requires constant communications.

General Situation:
Assume sailing on a beam reach or closer to the wind in moderate to heavy conditions.
Required Positions:

- HELM
- MAST
- MAIN HALYARD
- MAINSHEET
- REEFING LINE

Sequence of Events:

1. HELM calls out "Prepare to shake the reef". Crew removes sail ties from reef points and clew and takes positions.
2. MAST checks mast ensuring sail slides are free to run, takes position on the windward side of the mast, and reports "Ready Mast" to HELM.
3. MAIN HALYARD ensures halyard is clear to run, removes halyard from the self tailer, removes excess turns from winch, and reports "Ready Halyard" to HELM.
4. REEFING LINE ensures that the rope clutch on the appropriate reefing line to be eased is open, ensures that all sail-ties are removed, removes line from self tailer ensuring it is clear to run, and removes excess turns from winch. Reports "Ready Reef Line" to HELM

NOTE: ***If "Shake Both Reefs" is commanded, ensure that both rope clutches are open, and reef lines are free to run. If only the second reef is commanded to be shaken, REEFING LINE ensures that the first reef line is set correctly*****.**

5. MAINSHEET ensures vang and sheet are clear to run, ensures that all sail-ties are removed from the mainsail, takes position facing the main and reports "Ready MAINSHEET" to HELM.
6. After receiving "Ready" reports from crew, HELM calls out "Shake the reef" and maintains course, anticipating the boat's tendency to fall off once the main is eased.
7. MAINSHEET eases sheet until sail luffs and eases vang and is ready to trim as needed to prevent excess luffing as the reefing line is eased.
8. REEFING LINE eases reefing line simultaneously with sheet and halyard easing; continues easing as halyard is tensioned, ensuring the reefing line is slack.
9. MAIN HALYARD eases halyard as the sheet is eased; halyard is eased only enough to remove the cringle from reefing hook.
10. MAST unhooks the cringle as the halyard is eased then jumps halyard once the cringle is freed.
11. MAIN HALYARD trims halyard after cringle is freed, putting on extra turns as the halyard comes under tension. Works with MAST to watch luff tension as halyard is ground in; person watching sail tension calls "High".
12. Once halyard is "High", MAINSHEET trims sheet and vang.
13. MAIN HALYARD and REEFING LINE make off and coil respective lines.

3-3.4.10 HEADSAIL MANAGEMENT - LUFF GROOVE JIB/GENOA

The NAVY 44 MK II can be rigged with a foil headstay for more efficient sail changing during racing. The

foil is a plastic extrusion that fits over the rod headstay, and has two grooves that accommodate boltropes sewn onto the luff of the headsail. The advantage is that a new sail can be set and trimmed before the old sail is dropped, thus the need to make a "Bald Headed" change is eliminated.

3-3.4.10.1 BENDING ON A JIB/GENOA

Many of these sails are usually stowed in a sausage bag, with a breakaway zipper to facilitate setting and changing the sail. It is good practice to keep a sail tie around the luff of the headsail in the bag.

1. Select the desired sail depending on the wind/sea conditions.
2. Bring the sail up on the foredeck and place near the headstay. Tie the bag down.
3. Attach the tack cringle to the snap shackle at the stem fitting.
4. Attach the jib sheets to the clew cringle with a bowline. Lead the sheets to the proper track fairleads and to the corresponding winches at the cockpit. Genoas lead outside the shrouds. Jibs lead outside the forward lower shroud and inside the upper and aft lower shrouds.
5. Foredeck takes off the sail tie and taking care not to twist the sail, feed luff tape into the pre-feeder on the forestay, then into the luff grove on the forestay that corresponds to the shackle used for the tack, (port shackle = port groove).
6. Attach the jib halyard that corresponds to the shackle/groove used.
7. Take tension on the jib halyard to keep the head from falling out of the groove.
8. Tie stopper knots in the tail of the sheets according to skipper preference.
9. Lead the jib sheet to the winch.
10. Control the genoa fairlead position with the fairlead adjuster system at the forward end of the cockpit port and starboard, outboard of the cabin top.

NOTE: ***The run of the jib sheet from the block that determines the sheeting angle of the sail, to the winch, needs to be controlled. When this distance is great the sheet will whip as it is being sheeted in and may cause a winch over ride.***

3-3.4.10.2 CHANGING A HEADSAIL

The advantage is that with two luff grooves in the forestay a new sail can be hoisted on the second groove while the old sail is still flying and providing power. The boat does not have to be sailed "bald headed" while the new sail is raised. This is an important consideration while racing. Four methods can be employed depending on which side the free luff groove is located: Easiest to most difficult:

- INSIDE set INSIDE peel (tack change).
- OUTSIDE set INSIDE peel away (same tack).
- INSIDE set OUTSIDE peel away (same tack).
- OUTSIDE set OUTSIDE peel away (tack while changing) The importance of "Bearing Away" to change is diminished because sailing with a headsail continuously flying contributes to boat stability.

3-3.4.10.3 INSIDE SET, INSIDE PEEL

Crew positions involved:

- HELM
- FOREDECK
- FREECREW
- CAST OFF
- TAILER (works the tail of the new sheet)
- GRINDER (grinds the winch to take in the new sheet)
- MAST
- HALYARD WINCH (works halyard winches)

1. HELM Calls for the sail change, announces the type of change (e.g. “This will be a tack change!”) and directs FOREDECK in what headsail to use
2. FOREDECK goes below and gets the new sail ready to bring up on deck. Normally the new sail is brought up on deck through the fore hatch.
3. FREECREW stands by on deck until FOREDECK gives signal that new sail ready.
4. FOREDECK opens forehatch and starts new sail up.
5. FREECREW pulls sail on deck.
6. FOREDECK comes up through the hatch and closes the hatch.
7. FOREDECK and FREECREW take the sail bag forward, to windward of the sail that is set, with the head of the bag facing forward.

8. FOREDECK opens the front of the sausage bag and attaches the tack to the weather shackle. If conditions warrant, tie head of sail to the bow pulpit with a sail tie to ensure it does not go overboard while FOREDECK goes aft to get new halyard.
9. FREECREW unties the lazy sheet from the working sail and re-leads the sheet through the proper turning block and ties it to the new clew, ensuring the zipper of the sail bag will not be fouled when the bag is opened
10. FOREDECK attaches the new jib halyard, ensuring that it is clear of fouling other halyards or rigging.
11. HALYARD WINCH takes up slack in new halyard with one wrap on the winch drum and readies the working halyard to be eased.
12. FOREDECK takes the sail tie off the front of the headsail, then feeds head of the sail into the pre-feeder.
13. HALYARD WINCH watches FOREDECK and takes up on the halyard at each successful entry into the prefeeder and headfoil feeder.
14. FOREDECK calls “Ready Hoist, Ready Tack Set” when the sail is through the pre-feeder and started in the luff groove
15. HELM calls “HOIST” when all is ready to hoist the sail.
16. MAST is back at the new halyard to “Jump” the halyard while HALYARD WINCH tails the halyard.
17. FOREDECK watches the pre-feeder to ensure that there are no snags in the luff tape.
18. FOREDECK calls “High” when sufficient halyard tension is set.
19. HELM calls for the tack “Ready About" and listens for response from CAST OFF TAILER, FOREDECK/MAST and TRIMMER checks the area the boat will be sailing into after the tack
20. CAST OFF TAILER prepares the winch for tacking and calls “Ready (port/stbd)”
21. TAILER adds two wraps of the new headsail sheet on the new winch and calls “Ready port/stbd Sheet”
22. HELM calls “Tacking” as he turns the wheel.
23. MAST goes to the old halyard winch and eases off that halyard quickly as the boat comes about.
24. CAST OFF may just ease the old headsail sheet enough so that the sail “backs” against the wind a bit remembering that the sail is usually collected on the windward side of the boat.
25. FOREDECK pulls the luff tape down with force to expedite getting the old headsail to the deck, then uses the sail tie to secure the head of the sail.
26. TRIMMER & GRINDER take in on new sheet as the boat tacks and trims to course.
27. FOREDECK skirts the new headsail.
28. FOREDECK, MAST & FREECREW take the old headsail to windward and flake into the sail bag.

With practice, this method of inside tack set takes 30 seconds from the time the new headsail enters the feeder until the old sail exits the feeder.

HELPFUL HINTS AND COORDINATION:

- Crew communication will assist in making the evolution smooth.
- A "changing sheet" can be used. This allows for the new sheet to be run and tied to the new sail without disconnecting the lazy sheet from the loaded sail. The boat can continue to sail, AND TACK while the boat is being prepared for the sail change.
- Under most circumstances it is not prudent to leave a headsail on deck for a prolonged period. Consider lashing the old sail to the toe rail aft, or bag the sail and tie the bag down.
- Consider not releasing the old sail from the tack fitting until it has been bagged. This will prevent losing the sail over the side.

3-3.4.10.4 OUTSIDE SET, INSIDE PEEL

This procedure differs from the easiest**;** inside set, inside take down**,** in the following manner:

1. The new sail must be led outside the working jib before the head is fed into the pre-feeder and the luff groove.
2. The new halyard must be led forward and attach it to the new jib outside the working sail.
3. A changing sheet must be employed since the load will continue to be on the same side.
4. The possibility for fouled lines is increased.

3-3.4.10.5 INSIDE SET, OUTSIDE PEEL

In this procedure setting the sail is identical to the easiest case. The differences are that:

1. Care must be exercised on the take down to ensure that the sail is hauled in under the new sail that is already flying to keep it from falling overboard. Positioning FREECREW mid-way down the foot to

haul in the sail from under the working jib is helpful.
2. The old halyard will have to be led aft and around to the leech of the new sail before being brought in and stowed at the base of the mast.
3. A changing sheet is required since the load will not be changed to a lazy sheet.

3-3.4.10.6 OUTSIDE SET, OUTSIDE PEEL

This is the most difficult of the four maneuvers since both the set and peel away are on the outside. Positions involved:

- HELM
- FOREDECK
- FREECREW
- CAST OFF
- TAILER (works the tail of the new sheet)
- GRINDER (grinds the winch to take in the new sheet)
- MAST
- HALYARD WINCH

1. HELM announces the type of change ""This will be a tack change!" and directs FOREDECK as to what headsail is to be used.
2. FOREDECK goes below and gets the new sail ready to bring up on deck.
3. FREECREW stands by on deck until FOREDECK gives signal that new sail is ready.
   • FOREDECK opens foredeck hatch and starts bringing the new headsail up.
   • FREECREW pulls sail on deck to the toe rail with the head near the tack fitting.
   • FOREDECK comes up through the hatch and latches the hatch.
4. FOREDECK and FREECREW tie the bag to the toe rail.
5. FOREDECK ensures that the new halyard is clear, leads the new headsail halyard around the leech of the old headsail, pulling ample slack, and attaches the shackle to the bow pulpit outside the old headsail. FOREDECK then brings the head of the new sail under the foot of the old headsail, inside the pulpit, through the pre-feeder and into the leeward groove, and attaches the halyard to the new headsail, directing HALYARD WINCH to "take up slack".
6. FOREDECK wedges into the pulpit to ensure that the new sail feeds fairly into the luff groove.
7. FREECREW, MAST AND FOREDECK unzip the bag.
8. MAST attaches the CHANGING SHEET, ensuring the sheet is through the appropriate lead block, around and underneath the old headsail, and attaches it to the clew of the new headsail. The sheet will be trimmed on the secondary winch until the tack.
9. FOREDECK calls "READY FOR CHANGE" and awaits response from HELM.
10. HELM calls "HOIST"
11. MAST jumps the halyard as HALYARD WINCH tails.
12. As the headsail is being hoisted, FOREDECK attaches the tack of the new headsail to the appropriate tack shackle and calls "TACK MADE"
13. HALYARD WINCH takes final tension on new headsail halyard as directed by FOREDECK, who calls "HIGH!", then coils the tail of the new sail halyard.
14. TAILER has been taking up slack and now trims new headsail when the "High" call is announced, makes final adjustments with adjustable lead system.
15. MAST removes working sheet from old headsail, attaches to new headsail and re-leads it as the new windward sheet, led to the primary. The old windward sheet is led through a snatch block then to the secondary winch.
16. FOREDECK surveys the foredeck to be sure it is clear and reports, "Clear to tack", and stays in the pulpit.
17. HELM orders, "Ready About" and checks the area the boat will be sailing into after the tack to be sure it is clear.
18. HELM orders, "Helm's a-Lee", and tacks.
19. FREECREW takes up slack in the old sail jib sheet through the tack.
20. CAST OFF takes the jib sheet in hand and casts off.
21. TAILER, as the old sheet is cast off, tails as hard and fast as possible, taking more turns on the winch as needed.
22. GRINDER asks if TAILER has the required turns, inserts handle and commences grinding in the high speed direction as soon as the working sheet is cast off. Switches to low speed when the load becomes great and completes the trim of the jib

23. TAILER calls the trim.
24. HALYARD WINCH moves to old headsail halyard winch, carefully removes the coils from the halyard of the old jib winch so they can run with out fouling and eases halyard down at a rate dictated by FOREDECK.
25. FOREDECK pulls the old sail down underneath the new sail with help from FREECREW in the middle of the sail and MAST at the clew of the sail.
26. FOREDECK removes the halyard from the old sail and passes it to MAST.
27. MAST stows the old halyard taking care not to foul it.
28. FREECREW unties the sheet from the old sail, coils and stows it. FREECREW then re-leads windward jib sheet to the primary winch and reports, "Ready to tack", to FOREDECK
29. FOREDECK surveys the foredeck and when satisfied that it is clear, reports "Foredeck is clear to tack".
30. FOREDECK directs FREECREW and MAST in the bagging of the old sail.
31. The tack is released from the tack fitting.
32. FOREDECK directs FREECREW and MAST in stowing the old sail below.

HELPFUL HINTS AND COORDINATION:

- ***Crew communication will assist in making the evolution smooth.***
- ***Under most circumstances it is not prudent to leave a headsail on deck for a prolonged period. Bag the sail and tie the bag down aft of the foredeck, or stow below.***

3-3.4.10.7 SETTING THE GENOA STAYSAIL

A good sail combination for close reaching is the #2 genoa (high clew for better visibility to leeward), and the genoa staysail. The staysail will give back more power than what is lost from using the high clew #2 because it creates a second slot between the two head sails.

1. Rig the inner forestay and tension, keeping the halyards clear and the windward genoa sheet forward of the forestay.
2. Rig the running backstays. See 3-3.4.5.2 MAINSAIL TRIM.
3. Set the #2 genoa with any of the methods previously discussed.
4. Bring the genoa staysail up on the FOREDECK and place it near the forward lower shrouds. Tie the bag down.
5. Unroll the sail toward the inner forestay taking care not to let the sail fill in the wind.
6. Attach the tack to the tack shackle at the base of the inner forestay.
7. Hank the staysail to the inner forestay.
8. Lead the permanently attached sheets from the sail, outside the forward lower shrouds, and to the front car on the forward jib track. Lead the sheet aft to a snatch block on the toe rail in the vicinity of the secondary winch. Tie a figure eight knot in the end of the sheet.
9. Attach the topping lift (T-Lift) to the head of the staysail as the halyard ensuring it is not fouled on the forestay.
10. Hoist the sail on command from the Helmsman.
11. Trim the sheet so as to create a “slot” between the #2 genoa and the staysail. Read the tell tails on both head sails for this procedure.

3-3.4.10.7.1 TACKING WITH THE GENOA STAYSAIL

Tack the boat as with a single headsail remembering that the lazy genoa sheet is forward of the forestay thus hindering the passing of the #2 reacher across the foredeck. Back the staysail in the initial phase of the tack to give the #2 genoa a surface upon which to slide as it crosses from one side to the other, thus alleviating the problem of sheet hangup on the forward lower shroud. When the #2 genoa has crossed and is in the process of being trimmed, release the genoa staysail and tack the sail. It has been found that the use of the genoa staysail on close reaching or greater angle off the wind will yield an increase of at least ½ knot of boat speed.

3-3.4.11 SPINNAKER

The spinnaker is a special purpose sail used to augment speed when the boat is "off the wind".

3-3.4.11.1 SPINNAKER GEAR AND POSITIONS REQUIRED

The evolution described herein is for a "BEAR-AWAY" set.
Gear required:

- Spinnaker (packed)
- Spinnaker pole

- Spinnaker foreguy
- Spinnaker halyard
- Topping lift
- Two spinnaker sheets
- Two spinnaker guys
- Two large snatch blocks

Positions required:

- HELM
- GENOA TRIMMER
- MAIN TRIMMER
- SPINNAKER SHEET TRIMMER (COULD BE THE GENOA TRIMMER)
- SPINNAKER GUY TRIMMER (trims the spinnaker guy)
- GRINDER
- FOREDECK
- BOW (works the functions on the bow. Foredeck could be a distinct position to allow for overall supervision.)
- MAST (works the halyards, pole height at the mast)
- PREVENTER (tends the foreguy periodically, set and tend preventer, tends the topping lift).

3-3.4.11.2 RIGGING THE BOAT

This procedure can be done ahead of time in anticipation of using the spinnaker.

- Rig one snatch block to the port toe rail just aft of the midship lifeline stanchion.
- Rig the other snatch block to the corresponding starboard side.
- Attach the PORT spinnaker sheet at the port side of the bow pulpit, lead it outboard of the lifelines and shrouds, through the larger sheave in the spreecher block attached to the base of the stern pulpit at the end of the toe rail, then inside the lifelines to the cockpit.
- Rig the starboard spinnaker sheet to match.
- Attach the PORT afterguy snap shackle to the port spinnaker sheet bale at the port side of the bow pulpit, lead the guy outside of the lifelines to the snatch block, then into the cockpit.
- Rig the starboard afterguy to match. Make sure the spinnaker sheets are not trapped inside the guys.

NOTE: ***The guy is attached to the sheet bale so that in light air it can be disconnected to reduce the weight hanging on the clew of the spinnaker and the spinnaker can be controlled with a single sheet arrangement.***

NOTE: ***The foreguy is a continuous line that starts at a cam cleat on the outboard face of the cabin top, goes forward to a single block at a pad eye on the foredeck, to a bale on the bottom of the outboard end of the pole, and back down the opposite side of the boat..***

3-3.4.11.3 RIGGING THE SPINNAKER

The spinnaker pole is set to the windward side. Helm announces what jibe the spinnaker will be set on, what kind of set, (bear away set or gybe set), and when to start rigging.

1. Take the pole out of the deck chocks, pass the lazy jib sheet over pole and install the socket end of the pole to the spinnaker pole car on the track on the forward face of the mast. The outboard end of the pole is on the foredeck, on what will be the windward side of the boat when the spinnaker is set. In this configuration the boat can continue to be tacked, the jib passing over the pole.
2. Attach the spinnaker bag (turtle) to the lower and upper lifeline on what will be the leeward side of the boat for the set. Use the snap hooks on the bag, being careful not to trap the sheet and guy.
3. Unclip the windward spinnaker sheet/guy, take it outside the lifelines and pulpit, forward of the forestay, back over the leeward lifeline, under the jib and attach the sheet/guy snap shackle to the forward to the clew of the spinnaker. Open the jaw, lay the GUY in the jaw and close the jaw. Make sure the sheet stays on top of the pole.
4. Take the leeward spinnaker sheet/guy over the lifeline, under the genoa and attach it to the after clew.
5. The deck line for the preventer on what will be the leeward side can be rigged to the boom mounted pennant.
6. Attach the topping lift to the outboard end of the pole.
7. Take the spinnaker halyard corresponding to the leeward side of the boat at the set and lead it aft to the clew of the jib, pass it outboard above the trimmed headsail sheet, lead it down between the sail

and the lifelines, under the foot of the jib, and attach it to the swivel at the head of the spinnaker.
8. Re-check that the sheets, halyard, and topping lift are clear. Look Up. The spinnaker is ready to be hoisted.
9. This is as far as the rigging for spinnaker can go until the boat is on the last point of sail before setting the spinnaker.

3-3.4.11.4 SETTING THE POLE

1. Helm announces, "Standby to set the spinnaker".
2. BOW goes forward to pulpit, lifts the outboard end of the pole while PREVENTER takes in the topping lift. -MAST can "Jump" the topping lift at the mast to assist.
3. BOW re-checks to make sure the lazy sheet is on top of the pole. Re-check that lines are clear to run without fouling, particularly on lifeline stanchions. Report "Ready forward"
4. MAST lays out the working jib halyard tail so it is free to run and readies the spinnaker halyard for hoist.
5. MAST pre-sets a likely height for the spinnaker car on the mast track. Reports "Ready Mast".
6. SPINNAKER GUY puts appropriate number of wraps on the winch. Pre-set the foreguy for the anticipated angle of the pole and cleat the foreguy. Snug the topping lift. Report "Ready Guy".
7. SPINNAKER SHEET puts several wraps on the secondary winch on the cabintop. Make sure the lazy guy is clear. If this position is doubling as the GENOA TRIMMER, be prepared to ease the genoa slightly when the spinnaker is hoisted. Cleat the Genoa sheet. Standby to trim the spinnaker sheet when hoisted. Report "Ready Spinnaker sheet".
8. One SPINNAKER GRINDER is normally required. Two for higher wind strengths.
9. MAINSHEET TRIMMER ensures the sheet is clear, take the sheet in hand and report "Ready Mainsheet".

3-3.4.11.5 PRE-TRIM

Just prior to the set, SPINNAKER GUY takes on the guy to bring the clew out of the bag and up to the pole. The spinnaker pole should be about 3 feet off the headstay for hank-on headsail boats. The after guy (primary) winch must have 4 to 6 wraps on the drum at this point.

3-3.4.11.6 THE SPINNAKER SET

1. HELM gives command, "Set the Spinnaker".
2. HELM “bears off" to the appropriate course.
3. MAST tails while BOW hoists, hand over hand until spinnaker is all the way up. BOW calls “HIGH” so the trimmers can begin to trim the sail. MAST moves to jib halyard.
4. SPINNAKER GUY takes on the guy to expose the spinnaker to the apparent wind. Pole will eventually be trimmed to be perpendicular to the apparent wind.
5. SPINNAKER SHEET takes on the sheet to fill the spinnaker.
6. BOW or FOREDECK goes to the pulpit to take in the jib. FOREDECK (PREVENTER) can go to the mid-girth of the foot to help with the drop.
7. MAST keeps at least one turn on the winch, and lowers the jib quickly.
8. BOW disconnects the genoa halyard and connects it to the tack fitting. Depending on the length of time the spinnaker is expected to stay in the air, BOW can either bag the jib or lash it to the toe rail.
9. MAST makes up the spinnaker halyard tail. Ensures lazy sheet is overhauled and that shackle end is run over the top of the outboard end of the pole and wrapped a few times around the working guy from the inside out to prevent trapping the pole after it’s tripped.
10. MAINSAIL TRIMMER eases main to square it to the wind. Can assist with topping lift, foreguy and preventer when the apparent wind is > 120 degrees.
11. SPINNAKER GUY adjusts pole to be at right angles to the apparent wind. Respond to call from SPINNAKER SHEET for pole adjustments.
12. FREECREW stands by foreguy to maintain tension when the spinnaker pole is adjusted.
13. SPINNAKER SHEET keeps spinnaker full by easing sheet until the spinnaker luff curls, but pops out. Calls adjustments for pole up and down at mast and at outboard end, as well as fore and aft.
14. PREVENTER works the preventer line for the appropriate side and ensures that all lines are lead fair.

HELPFUL HINTS AND COORDINATION.

1. Communication is the key to successful spinnaker work.
2. It is sometimes helpful to say "Pole to Port [STBD]" when announcing the preparation for spinnaker.
3. Basic tenets for spinnaker trim:

- Pole perpendicular to the apparent wind.
- Pole parallel to the water.
- Clew heights equal.
- Keep position of pole as constant as possible.
- Ease spinnaker sheet.
- Call for course change (to include gybe) if wind shift is major.
- Ensure that the cleats for the spinnaker pole car adjustment line are well secured.

3-3.4.11.7 GYBING THE SPINNAKER

Safety Considerations:

- Ensure sheets and guys are clear forward and in the cockpit.
- Visually check that the intended course is clear of other boats, shipping, and navigation hazards.
- Ensure crew members are in "safe zones" for the maneuver.

WARNING: ***STAY AWAY FROM THE MAINSHEET TRAVELER. BE MINDFUL OF THE MAINSHEET TACKLE AS THE GYBE IS EXECUTED.***

WARNING: ***TRIM THE BOOM TO CENTERLINE BEFORE "GYBE HO!" AN OUT OF CONTROL BOOM CAN CAUSE SERIOUS INJURY TO PERSONNEL AND MAY CATCH ON THE BINNACLE GUARD.***

- Trim the boom to centerline before the boom is crossed to the other side of the boat.
- HELM is in control of the maneuver.
- Communications is the key to a safe gybe.

General Situation:

Assume sailing on a broad reach in moderate conditions.

Positions Required:

- HELM
- SPINNAKER SHEET
- SPINNAKER GUY
- GRINDER/PREVENTER
- TOPPING LIFT
- MAINSHEET
- FOREDECK
- BOW
- MAST

Sequence of Events:

1. HELM calls "Prepare to Gybe". When possible include what point of sail the boat will be on upon completion of the maneuver.
2. FOREDECK checks to see that the windward spinnaker sheet is not fouled under the spinnaker pole end. Procedure must be stopped and remedied before continuing if sheet is fouled.
3. SPINNAKER SHEET stands forward in cockpit, ensures both sheets are clear, places sufficient turns on the new secondary winch, stands in cockpit, continues to trim, maintains tension on lazy sheet, and reports "Ready Sheet" to HELM.
4. SPINNAKER GUY stands aft if spinnaker trimmer, ensures both guys are clear, places sufficient turns on the new primary winch, stands in cockpit, continues to trim, and reports, "Ready Guy" to HELM.
5. GRINDER breaks the preventer.
6. MAINSHEET removes sheet from the self-tailer, ensures sheet is clear, cleats traveler on both sides, and reports, "Ready Main" to HELM.
7. TOPPING LIFT ensures topping lift and foreguy are clear, takes topping lift out of self-tailer, and reports, "Ready Topping Lift", to HELM.
8. MAST ensures inboard end of pole is at the proper height for dipping outboard end and tripping line is clear. Reports, "Ready mast", to HELM.
9. BOW (FOREDECK) takes bight of lazy guy to pulpit, positions himself forward of the headstay facing aft with lazy guy in hand, and reports, "Ready bow", to HELM.
10. After receiving ready reports from the crew, HELM, calls "Bearing away" and turns the boat away from

the wind. MAINSHEET, SPINNAKER SHEET ease, and SPINNAKER GUY squares the pole back to the apparent wind, while FREECREW eases the foreguy. Basically the pole should be as far aft as possible before tripping. Care is required to avoid forcing the spinnaker pole against the forward lower shroud.

11. When wind reaches 150-160 degrees apparent, MAINSHEET trims the mainsail, timing it so that the boom is amidships before the boat is dead down wind. An extra crew member can help with the trim on the leeward mainsheet winch.
12. HELM calls “Trip" with the stern to the wind. HELM should momentarily delay with the boat DOWNWIND until steps 13 through 18 are completed.
13. At the "trip " MAST trips outboard end to release the afterguy, TOPPING LIFT eases the pole smartly to pre determined position so that pole end will clear inside forestay, and above lifeline. SPINNAKER GUY casts off the old guy.
14. As the pole dips and swings through the fore triangle, BOW/FOREDECK snaps new after guy into open jaw at the end of the pole ensuring that the shackle is on the trailing edge of the pole. Once the jaw closes, ensures pole has cleared the headstay to the new side and calls out, "Made".
15. At the call "Made”, MAST jumps topping lift and adjusts inboard end as necessary.
16. TOPPING LIFT trims topping lift to proper height and stands by to adjust foreguy as necessary.
17. SPINNAKER GUY begins to trim new guy. Positions pole to apparent wind.
18. SPINNAKER SHEET begins trimming on new sheet, eases off old sheet as new guy approaches the outboard pole end. The spinnaker is rotated across the bow of the boat by trimming it as the boat turns.
19. HELM calls out "GYBE HO!" and turns the boat so the wind is about 160 degrees on the new gybe.
20. MAINSHEET EASES THE MAINSHEET to the expected point of sail once on the new heading.
21. HELM continues the turn.
22. GRINDER sets the new preventer line and assists as necessary. (Usually the new spinnaker sheet winch needs grinding first).
23. SPINNAKER SHEET does not ease old sheet until the guy has taken the load.

HELPFUL HINTS:

- ***Mark the topping lift with a whipping, Sharpie pen or colored tape at the position where it is in contact with the winch when the pole is able to clear above the lifelines and pulpit, yet low enough to pass inside the headstay.***
- ***Hold the boat downwind until the spinnaker guy is "made" on the new side. Trim the mainsheet in close, to place the boom on or near the centerline of the boat. Wind is channeled from “dead aft” to the spinnaker on both sides so that it can continue to fly without the aid of the pole.***

3-3.4.11.8 SPINNAKER TAKE-DOWN (DOUSE)

The genoa is usually hoisted before the spinnaker is doused. This aids in two ways:

- Maximum power is kept on the boat through the maneuver.
- The genoa creates a "LEE" for the controlled collapse of the spinnaker.

Safety Considerations:

1. Ensure sheets and halyards are clear to run and not tangled.
2. DO NOT STAND IN ANY BIGHTS!
3. Always keep at least one turn on the spinnaker halyard winch while dousing...even in light winds.
4. If you lose control of the halyard, do not attempt to grab it to stop it if you’re not wearing gloves.
5. Communication is the key to a safe take down.

General Situation:

Assume beam to broad reaching in moderate conditions. The jib should be raised before the spinnaker is doused. This sequence of events assumes the spinnaker will be dropped behind the jib (a leeward take-down). There are other methods of dousing the spinnaker in racing situations.

Required Positions:

- HELM
- BOW
- MAST

- MAINSHEET
- TOPPING LIFT
- SPINNAKER GUY
- SPINNAKER SHEET
- GENOA SHEET (this may be covered by spinnaker sheet).
- GATHERERS and FREECREW

3-3.4.11.8.1 PREPARATION

Sequence of Events:

1. HELM calls out "Stand by to raise the jib".
2. BOW ensures the genoa is ready to hoist on the proper side; that the genoa halyard is clear; stands by to jump genoa halyard and reports "Ready to hoist the genoa", to HELM.
3. MAST ensures the genoa sheets are clear, stands by to jump genoa halyard, reports "Ready genoa halyard" to HELM.
4. GENOA SHEET ensures at least two turns on the primary winch on the new leeward side, and reports, "Ready genoa sheet", to HELM.
5. GATHERERS are deployed forward of the leeward shrouds, take the lazy guy in hand, lead it over and inside the lifelines and underneath the jib forward of the jib sheets and report, "Ready Gatherers", to HELM.

3-3.4.11.8.2 THE SPINNAKER TAKE-DOWN

1. HELM calls out, "Hoist the Genoa".
2. MAST jumps Genoa Halyard.
3. FREECREW tails on the genoa halyard winch, then goes forward to help gather.
4. MAST assists by taking winch handle and grinds, then shifts to spinnaker halyard. Takes it from the self tailer, assumes position to be able to see gatherers and reports, "Ready spinnaker halyard", to HELM.
5. BOW calls, "High", when the genoa is fully hoisted.
6. BOW opens forward hatch, hands lazy guy to gatherer in forepeak, reports “Ready" to HELM.
7. GENOA SHEET trims the genoa for the expected point of sail.
8. After receiving "ready” from BOW, HELM calls out, "Douse the Spinnaker".
9. SPINNAKER GUY eases the guy so the pole goes forward, then makes sure guy is free to run.
10. SPINNAKER SHEET eases the sheet and makes sure both sheets are free to run.
11. BOW and GATHERERS take in on the lazy afterguy, then gather as much of the foot as possible, then start taking in on the spinnaker itself.
12. MAST watches the gatherers and eases the halyard so as to feed the spinnaker to the gatherers as they are able to take it in.
13. TRY TO KEEP THE SPINNAKER OUT OF THE WATER.
14. Spinnaker is passed to crewmember down below in the forepeak as it is doused.
15. Once the spinnaker is doused, TOPPING LIFT lowers the outboard end of the pole so that BOW can handle it.
16. MAST lowers the Inboard end.
17. All hands ensure all lines are onboard and not trailing in the water.
18. The spinnaker halyard is returned to the stowed position ensuring that it is clear of the headstay and all other halyards and rigging.
19. The spinnaker is re-packed, and all lines are either re-led for the next spinnaker hoist, or the spinnaker, lines and pole are stowed.

3-3.5 ELECTRICAL POWER MANAGEMENT

The Navy 44 Mk II has A 12v DC electrical system. It is provided through two banks of batteries. The battery banks are:

- House Battery Bank (Ship Service or SS)
- Engine Start Battery

The SS Bank is comprised of four 105 amp-hour AGM batteries. The Engine Start consists of one 105 amp-hour AGM battery. Battery power is a limited resource that requires close management. While the batteries

can be recharged using the engine-mounted alternators, frugal management of electrical power will ensure that power is available for necessary usage. When operating under sail the batteries are not being charged, only depleted.
For maximum battery life, do not discharge the battery bank below 50%. The table below lists the open circuit (no load) voltages corresponding to states of charge:

State of Charge	Open Circuit Voltage
100%	12.80 V or greater
75%	12.55 V
50%	12.20 V
25%	11.75 V
--0%	10.50 V

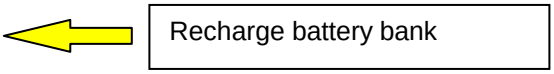


Table 3-3 Battery State of Charge

The battery can be recharged by turning the engine ON and running it out of gear at approximately 1500 rpms. When operating the refrigeration system underway, a longer charging time will be required to bring the system back to a comfortable operating level. A good rule of thumb is “If you don’t need it, turn it off”.

3-3.5.1 ELECTRICAL SYSTEM LINEUP

Place the ENGINE BATTERY rotary switch on the inboard face of the nav station seat and the IGNITION ENGINE breaker on the DC Distribution Panel in the ON position. This energizes the engine starting system. Follow procedures for starting the engine.

3-3.5.2 BATTERY POWER SOURCE AND CHARGING PROCEDURE

The batteries can be charged either using shoreside 120V AC power or by running the engine and charging with the two alternators.

3-3.6 FRESH WATER MANAGEMENT

With only 175 gallons of fresh water this limited resource must be managed frugally on long passages. Water is stored in two 70 gallon tanks, one under each settee berth in the main cabin, and one 35 gallon tank (day tank) located beneath the floorboard in the galley. Water is measured by recording how much is used through the day tank.
Ensure that the selector valves for the port and starboard 70 gal tanks and the daytank are in the **OPEN** position. Close the gravity feed valves that flow into the day tank from the port and starboard tanks. Water will now be drawn from the 35 gallon day tank. When the spigot spits air, the day tank is empty. To refill:

- Open the valve for one of the 70-gallon tanks.
- Fill the day tank.
- Close the valve from the 70-gallon tank.
- Record in the log book that 35 gallons were transferred to the day tank, and what tank it was transferred from. Record this information each time the day tank is filled. This makes it possible to know how many gallons of fresh water remain in the system if the tank tender system is inoperable.

3-3.7 HOLDING TANK MANAGEMENT

The holding tank can be emptied two ways. Contents can be removed at a pump-out station or by a pump-out boat, or the contents can be emptied overboard when 25 or more miles offshore, using the macerator pump.
To empty holding tank via pump-out:

- Open deck fitting on starboard side.
- Follow instructions from pump-out station on hooking up pump.
- Monitor tank level while pumping out to determine when tank is empty.
- Replace deck fitting lid.

To empty holding tank via macerator pump:

- Ensure head and holding tank discharge through-hull fitting is open.
- Set Y-valve on holding tank.

- Set Macerator Pump switch on DC main panel to “ON”.
- Monitor tank level while pumping out to determine when tank is empty. If pumping out while underway and the engine is off, you can also monitor the DC battery load, which will drop when the pump is operating under less load when the tank nears empty.

3-3.8 MARINE HEAD OPERATION

The Wilcox Crittenden Skipper II 1550 Marine Toilet operation procedures are:

- Ensure head sea-water intake through-hull fitting is open.
- Check position of discharge valve, located in cabinet under head sink. It should go to holding tank for inshore operations, or overboard if 25 miles offshore. A plaque with correct position is located inside the cabinet door.
- If overboard discharge is chosen, ensure head discharge through-hull fitting is open.
- To add water to the bowl, press down on foot pedal while operating pump handle.
- Release the foot pedal to pump waste out.
- Repeat if necessary.
- Pump an additional 5-10 times to ensure there is no standing water in the bowl.
- Upon securing STC for greater than 24 hours, rinse bowl with fresh water and pump through system (minimum of 5 pumps) leaving approximately 3” of standing water in bowl, to reduce/eliminate algae growth and foul odors from developing. Pumping white vinegar through system and into holding tank when winterizing will also help minimize odors.

3-3.9 PROPANE STOVE OPERATION

The Force 10 stove and oven/broiler uses Liquid Petroleum Gas (LPG) to operate. Follow these procedures to operate safely:

- Turn bilge blower on prior to use.
- Turn gas on (rotate tank valve to “open”) at tank in aft starboard lazarette.
- Turn solenoid in galley “on”.
- Follow instructions on stove to light burners or oven.

To turn off:

- Turn gas at tank off (rotate tank valve to “closed”), leave burner or oven on until flame extinguishes.
- Turn solenoid in galley off.
- Turn knobs for burner and/or oven off.
- Turn bilge blower off.

CHAPTER 4
MAINTENANCE

4-1 INTRODUCTION

This chapter contains the maintenance and repair procedures that can be accomplished by the crew while the boat is in their custody, in a remote port or underway. A tool kit and engine spares kit are provided on each NAVY 44. Included are actions that serve to alert the crew of certain safety related maintenance and repair actions that should be attended to periodically.

4-2 CARE OF SAILS AND RIGGING

- Every time a sail is hoisted or an item of equipment is used it should be inspected for condition. A torn sail should not be hoisted, rather the next best suitable alternate should be used, i.e., use the #2 Genoa if the #1 is in need of repair.
- Simple repairs can be accomplished onboard with the sail repair kit.
- Inspect for and tape sharp objects on the boat that may cause chafe or rips, i.e. exposed cotter pins.

4-3 AUXILIARY DIESEL ENGINE

Inspections and corrective procedures on the following engine systems are to be performed according to the equipment manuals. The recommended practices are designed to prolong equipment life and assist in the handling of same. The engine log checklist must be filled out to ensure all points of inspection are completed prior to starting.

- fuel system
- cooling system
- starter
- lubricating oil
- alternators
- refrigeration compressor

The Yanmar Diesel is a four cylinder directly injected naturally aspirated water cooled four cycle engine. A complete listing and description of the engine is in the Operation Manual.

NA 21-NA 25 have Yanmar model 4JH4.
NA 26-NA 36 have Yanmar model 4JH4AE.

Figure 4-1 Yanmar Engine

WARNING: Never use ether to start engine.

4-3.1 ENGINE ACCESS

The engine is protected by a sturdy fiberglass cover, which has hinged inspection hatches for access to selected components. A normal engine inspection prior to getting underway requires complete removal of the cover. Close the companionway hatch before removal of the cover to prevent topside crew from falling into the engine. Remove the ladder and step, and open all latches on the engine cover. The aft half must be removed before the forward portion due to the overlapped construction. The forward half of the cover must be lifted approximately one inch to break the seal to the cabin sole (and clear the lip that holds the cover in place). Move the cover to starboard approximately 3 inches to clear the alternator, then lift away from the forward half of the engine. The protruding box on the forward starboard corner seen in Figure 4-2 allows room for the house bank alternator. Take care to avoid damaging the insulation inside the cover. The insulation reduces noise and heat in the cabin.

Safe removal of the cover in a seaway requires two crew. Each half of the cover requires a large space away from the engine for stowing. Exercise caution in the handling of the forward half due to the stanchion rail protecting the galley.

Figure 4-2
Engine Cover Access Hatches

4-3.2 FUEL SYSTEM

All diesel fuel supplied to the engine is passed through a primary filter/water separator (Racor) and a secondary engine mounted filter, before reaching the injectors.

WARNING: ***WORK ON THE FUEL SYSTEM ONLY WHEN THE ENGINE IS COOL TO AVOID BURNS.***

4-3.2.1 PRIMARY FUEL FILTER CLEANING AND REPLACEMENT

The primary Racor filter/separator is mounted on the port bulkhead inside the engine compartment. The filter element should be replaced if fuel is visibly contaminated or known to be contaminated. Look for water or debris in the clear glass bowl on the bottom of the filter assembly. See Figure 4-3 Racor fuel filter.

Before starting this procedure, ensure that the following are on hand:

RACOR replacement filter element, (see service manual for part number) with new gasket seal.

- Clean lint-free rags.
- A spill container, (bucket).
- A container with clean diesel fuel.

NOTE: Contaminated fuel removed from the system or used in the cleaning of fuel system components should be delivered to a contaminated fuel disposal station. Do not dump it at sea.

Figure 4-3 Primary (Racor) Fuel Filter

1. Place a suitable spill container directly under the filter/separator.
2. Open the bottom drain petcock and drain sediment and/or water. Close the petcock
3. Place an oil absorbent cloth and drip pan under the filter to prevent fuel from getting into the bilge. Unscrew the T-handle and set it aside until reassembly. Remove the disposable filter by lifting, and place in a sealable container. Remove any debris and leave the excess fuel in the filter housing. Insert a new filter cartridge and seat it carefully. Remove the o-ring seal and replace with a new one. Apply a thin film of clean diesel fuel to the sealing surface of the new o-ring seal and carefully top up the fuel in the filter body to displace as much air as possible. Reseal by placing the filter top on the body and rotating the T-handle until hand tight (do not over tighten).

4. Clean the exterior of the assembly.
5. See “Bleeding the Fuel System” (4-3.2.3) to bleed the low pressure side of the fuel system.
6. Start the engine and let run at a fast idle to ensure the positive fuel continues to flow.

Continue to check the RACOR filter for water or debris and remove as necessary.

4-3.2.2 SECONDARY FUEL FILTER REPLACEMENT

Before starting this procedure, ensure that the following are on hand:

- Replacement fuel filter (see service manual for part number) and new gasket seal.
- Open-end 12 mm wrench for NA 21-25, 10 mm wrench for NA 26-44.
- Clean lint-free rags.
- A spill container, (bucket).
- A container with clean diesel fuel.

The secondary filter is an engine mounted unit located on the uppermost starboard forward side of the engine. This filter removes any impurities which have bypassed the primary filter. Replace it when the primary fuel filter is replaced.

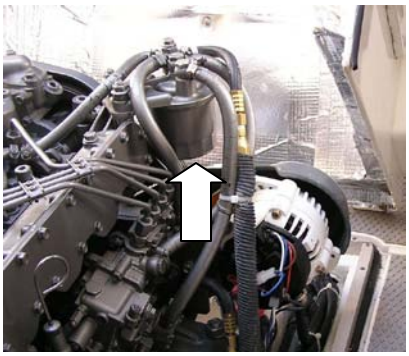


Figure 4-4 Secondary Fuel Filter (top center)

1. This filter is removed by unscrewing. If the filter cannot be turned by hand use a filter strap wrench.
2. Remove the filter element by lowering into the waste bucket which was placed under the filter. Discard the element and old gasket seal.
3. Clean the seating surfaces and visually inspect the housing. Apply a thin film of clean diesel fuel to the sealing surface of the new seal and place on the new filter. Carefully fill the new filter with clean fuel, center in position and tighten hand tight. Clean the exterior of the filter assembly.
4. See “Bleeding the Fuel System” (4-3.2.3) procedures below Start the engine and let run at a fast idle to ensure the positive fuel continues to flow.

4-3.2.3 BLEEDING THE FUEL SYSTEM

When any component of the fuel system is opened to the atmosphere, it must be bled of any trapped air from the low pressure side of the fuel system. The Yanmar engine has a low and high pressure side. The fuel injector pump delivers exact amounts of fuel to each cylinder as needed during compression which causes ignition. The injection pump has little or no maintenance which can be performed by the operator.

WARNING: THE HIGH PRESSURE SIDE OF THE FUEL SYSTEM IS 3000 PSI. DO NOT CRACK THE INJECTORS OR OTHERWISE ATTEMPT TO BLEED THE HIGH PRESSURE SIDE OF THE ENGINE.

CAUTION: Do not attempt to turn over engine key without attaining ignition for more than 15 seconds at a time. If engine is cranked more than 15 seconds, close the seacock to avoid hydrolock in the muffler, then crank again to get air out. When engine starts, open seacock immediately.

If the engine only idles or won't start after several attempts, there may be air in the fuel system. If air is in the fuel system, fuel cannot reach the fuel injection pump. Vent or “bleed” the air in the system according to the following procedures.

Fuel System Air Venting Procedures for NA 21-25:

1. Ensure both the fuel supply and return valves at the tank are open.
2. Check the fuel level in the fuel tank. Replenish if insufficient.
3. Loosen the air vent bolt on top of the secondary fuel filter by turning it 2 or 3 turns. Position an oil zorb below the filter to catch fuel.
4. Feed fuel with the fuel lift feed pump by moving the lever on the left side of the feed pump up and down.
5. Allow the fuel containing air bubbles to flow out from the air vent bolt holes. When the fuel coming out no longer contains bubbles, tighten the air vent bolt.
6. This completes the air venting of the fuel system. Try starting the engine again.
7. In subsequent engine operation after the start-up, the automatic air-venting device on the high pressure side works to purge the air in the fuel system.

Figure 4-5 Air Vent Bolt for NA 21-25

Fuel System Air Venting Procedures for NA 26-36:
(self-bleeding system)

1. Ensure both the fuel supply and return valves at the tank are open.
2. Check the fuel level in the fuel tank. Replenish if insufficient.
3. Turn engine ignition key to “ON” position to activate electric fuel pump, and hold for no more than 15 seconds at a time to bleed the engine. Wait one minute between attempts. After the second time turn to “START” position.
4. If engine does not start, position an oil zorb or rag underneath the filter, remove hose clamp and hose indicated by arrow, and turn engine ignition key to “ON” position for 15 seconds. You will be able to see the fuel coming out of the T-fitting on the filter lid where the hose was removed. Once the fuel runs free of bubbles, reinstall hose and clamp. Turn key to “ON” for 15 seconds, then to the “START” position.
5. Once ignition is attained, air venting of the fuel system is complete.
6. After start-up, the automatic air-venting device on the high pressure side works to purge air in the fuel system.

Figure 4-6 Secondary Fuel Filter NA 26-36

After the engine has started, check the following items at a low engine speed:

1. Check that the gauges and alarm devices on the instrument panel are normal.
2. Check for water, fuel or oil leakage from the engine.
3. Check that exhaust color, engine vibrations and sound are normal.
4. When there are no problems, keep the engine at low speed with the boat still stopped to send lubricating oil to all parts of the engine.
5. Check that sufficient cooling water is discharged from the seawater outlet pipe. Operation with inadequate seawater discharge will damage the impeller of the seawater pump. If seawater discharge is too small, stop the engine immediately. Identify the cause and repair.

- Is the seacock open?
- Is the inlet strainer on the hull bottom clogged?
- Is the seawater suction hose broken, or is the hose sucking in air due to a loose connection?

The engine will seize if it is operated when cooling seawater discharge is inadequate or if load is applied without any warming up operation.

4-3.3 ENGINE EMERGENCY STOP

If the engine cannot be stopped by the normal method of pushing and holding the black STOP button on the engine in the cockpit, check to ensure the key is in the "ON" position. The secondary method of stopping the engine should be the T-handle located next to the throttle. Pull up on the handle to stop the engine, push the handle back down after the engine stops.

If neither of the methods above work to stop the engine, use the emergency stop switch located on the starboard side of the engine. It is a red button located at the aft end of the fuel pump. NEVER use the emergency stop switch for a normal engine shutdown.

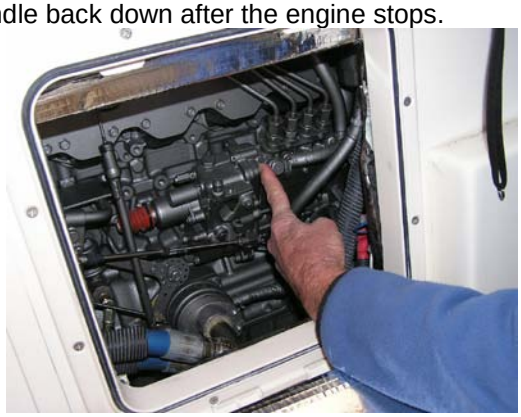


Figure 4-7 Emergency Stop Button (red button), *located aft of fuel pump which is pointed out.*

4-3.4 ENGINE OIL AND FILTER

Engine oil level should be checked as specified in the SOP checklists and recorded in the maintenance log.

1. The engine should be as level as possible before checking the oil level to get an accurate reading.
2. Remove the dipstick and wipe with a clean cloth.
3. Fully reinsert the dipstick, remove and check the level. The oil level should be between the upper and lower marks on the dipstick.

If the oil level is low:

1. Remove either the filler port cap (yellow) at the top of the rocker arm cover or the lower yellow filler port cap, and fill with Yanmar 15W-40 engine oil supplied with the boat.
2. Fill with oil to the upper limit on the dipstick. Insert the dipstick fully to check the level.
3. NEVER overfill the engine with oil. Full = 5.0 liters or 5.3 quarts
4. Tighten the filler port cap securely by hand.

Regular PMS will be performed by maintenance personnel at prescribed time intervals (50 hours for the first change, every 250 hours thereafter). Oil and filter changes should only be performed underway if the system is contaminated. Before starting this procedure, ensure that the following are on hand:

- Oil filter wrench
- Clean lint-free rags
- Container for dirty oil
- Transfer pump
- Replacement oil filter
- Engine oil (do not mix different types or brands) Yanmar 15W-40 weight

Figure 4-8 Oil Filter Access

NOTE: It is easiest and most effective to drain the engine lubricating oil after a few minutes of operation which warms the oil.

1. Remove the lubricating oil dipstick. Attach the oil drain pump to the top of the dipstick tube and pump out the oil. Beware of oil splashes if extracting the oil while it is hot.
2. For easier draining, remove the oil filler cap (yellow) at the top of the rocker arm cover.
3. Remove the lubricating oil filter with the filter detach/attach tool (Turn counterclockwise.)
4. Clean the filter installation face. Apply a thin film of oil to the new seal, seat on the filter and attach the new filter, tightening by hand until the seal touches.
5. Turn an additional 3/4 of a turn with the attachment tool. (Turn clockwise. Tightening torque: 20 -24 Nm (177-212 Ib-in).
6. Fill with new lubricating oil.
7. Perform a trial run and check for oil leaks.
8. Approximately 20 minutes after stopping the engine, remove the oil dipstick and check the oil level. Add oil if the level is too low.

Use only the oil filter specified in the service manual since the high pressure will damage or bypass other brands of filters. Refer to the service manual for the Yanmar filter number.

4-3.5 GEAR LUBRICATING OIL

Marine gear (transmission) oil is checked with the orange cap oil dipstick accessed through the aft engine box inspection hatch, on top of the transmission. The marine gear has a 1.1 Liter (2.3 pints) capacity (do not overfill), and uses Yanmar 30 weight oil.

To check oil:

1. Make sure engine is level.
2. Remove filler cap (dipstick is attached to bottom of cap) and wipe with clean cloth.
3. Re-insert dipstick, remove and check oil level. Oil level should be between upper and lower lines.
4. If oil is low, fill with marine gear lubricating oil, being careful not to overfill.
5. Re-insert the dipstick fully and tighten the filler port cap securely by hand. Do not overtighten, it may break the cap.

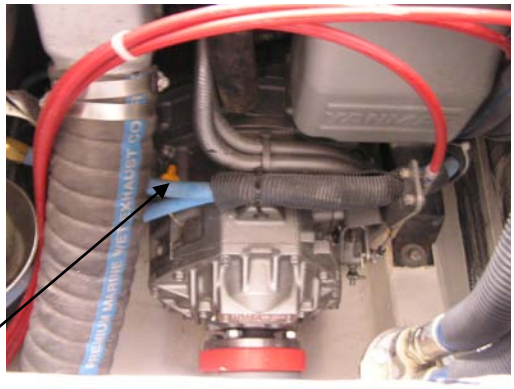


Figure 4-9 Marine Gear Oil Dipstick and Orange Filler Port Cap

4-3.6 COOLING SYSTEM

There are two cooling systems: freshwater (coolant/anti-freeze) and seawater (or raw water). The engine's combustion heat is cooled by the freshwater/coolant on a closed circuit. The freshwater is cooled by seawater using a heat exchanger. The seawater also cools the engine and gear oil.

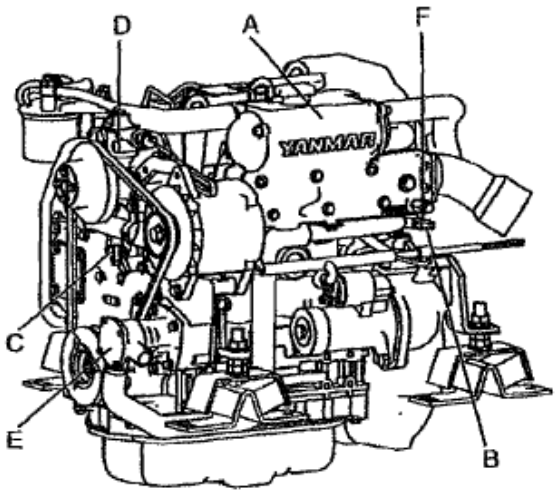
The engine has a captive anti-freeze/water internal cooling system. The coolant plumbing is run through a heat exchanger that uses raw sea water to cool the internal coolant.

NOTE: *The engine must not be running during the following procedures*.

4-3.6.1 SEA WATER COOLING SYSTEM

Maintenance items in this system are:

- Sea water strainer.
- Replacement of the pump impeller.



A Coolant tank
B Drain cock for seawater
C Drain cock for fresh water
D Fresh water pump
E Seawater pump
F Drain cock for fresh water

Figure 4-10 Engine Cooling System

Figure 4-11 Battery Charger, Sea Water Strainer and Sea Water Intake Through Hull; *port locker aft of engine box*

4-3.6.1.1 CLEANING THE SEA WATER STRAINER

No tools or supplies are required for this procedure.

1. CLOSE the ENGINE INTAKE seacock.
2. Unscrew the top cover plate and remove.
3. Lift out the mesh strainer and clean as needed.
4. Clean the top access cover mating surfaces.
5. Return top access cover to original position and hand tighten.
6. OPEN Engine Intake Seacock.

4-3.6.1.2 REPLACE SEA WATER PUMP IMPELLER

Before starting this procedure ensure that the following are on hand:

- Two blade type screwdrivers and wrench set.
- Replacement impeller, refer to Yanmar service manual.

1. Close the ENGINE INTAKE seacock.
2. The seawater pump is located on the forward, port lower corner of the engine outside of the drive belt cover (See Figure 4-8, item E).
3. The forward facing plate secured with four bolts must be removed exposing the pump impeller.
4. Pull out the damaged impeller from the shaft, making sure all loose, damaged parts are removed. Loosen hose clamp and remove hose from bottom of impeller housing and tap to remove any impeller parts. If impeller parts are unaccounted for, do not run engine until inspection is accomplished by a certified mechanic.
5. Submit maintenance chit upon return to home port if impeller is replaced underway.
6. Remove the old o-ring around the cover plate periphery.
7. Insert the new impeller onto the shaft.
8. Install cover plate with a new o-ring, hand thread the four bolts and tighten down evenly for a snug fit.
9. Open the SEAWATER INTAKE seacock and check for leaks.
10. Operate the engine and observe the overboard discharge, and check for leaks at the impeller cover.

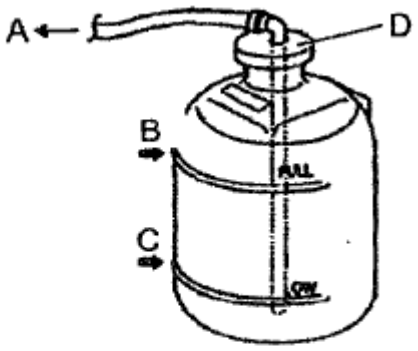
WARNING: ***IF NO OVERBOARD DISCHARGE IS SEEN SHUT DOWN THE ENGINE IMMEDIATELY.***

4-3.6.2 FRESHWATER COOLING SYSTEM

Yanmar brand pre-mixed coolant/anti-freeze is used for boil/freeze engine protection. Each MK II should have a supply of Yanmar UltraLife YG coolant on board. This product is dyed red. ***Do not mix coolant brands, and do not use green or yellow coolants in the Yanmar engine.***

4-3.6.2.1 ADDING COOLANT

Check the fresh water level at the plastic recovery tank while the engine is cold.



A To fresh water cooler C Lower limit
B Upper limit D Cap

Figure 4-12 Coolant Recovery Tank

If level is between "LOW" and "FULL";

1. Open the fill cap on the engine expansion tank.
2. Fill the engine expansion tank with coolant.
3. Close the cap on the expansion tank and make sure the hose between the expansion tank and the recovery tank is properly connected.

The coolant recovery tank cannot be filled without removing the engine cover completely.

If the fluid level is below the "low" level.

1. Check the bilge for coolant leaks.
2. Check to see if hoses are attached properly, reattach if necessary.
3. Report to OIC/Skipper or Cutter Shed if based at USNA or upon return to USNA.

When coolant leak has been found and fixed, follow the steps below to refill:

1. Remove the filler cap of the engine expansion tank.
2. Pour coolant slowly into the tank so that air bubbles do not develop. Pour until the water overflows from the filler port.
3. After supplying coolant, replace the filler cap and tighten it firmly. Failure to do so will cause water leakage. To replace the cap, align the tabs on the bottom of the cap with the notches on the filler port and turn clockwise 1/3 of a turn.
4. Remove the coolant recovery tank cap and fill with coolant mix if needed.
5. Replace the cap. The coolant recovery tank capacity is 0.8 L(1.7 pints}
6. Check the rubber hose connecting the coolant recovery tank to the fresh water cooler. Be sure the hose is securely connected and there is no looseness or damage. When the hose is not watertight, an excessive amount of cooling water will be used.

WARNING: ***NEVER OPEN THE EXPANSION TANK WHEN ENGINE IS HOT. THERE IS DANGER OF BURNS FROM ESCAPING STEAM. FILL ONLY WHEN SYSTEM IS COOL.***

WARNING: ***IF THE FILLER CAP IS LOOSE, STEAM AND HOT WATER WILL ESCAPE WHICH MAY CAUSE BURNS.***

4-3.7 ALTERNATORS

The engine has two alternators, an engine start and a house bank, located on opposite sides of the engine. The engine start alternator is mounted on the port outboard side of the engine. The house bank alternator is located on the starboard lower corner of the engine. The house bank alternator extends into the attached "box" on the forward starboard corner of the cover. This alternator supplies 100 amps to charge the house bank of batteries. There is a breaker for the 100 amp alternator located inside the engine box, (front half of box must be removed to access) mounted in the forward starboard corner of the engine pan. Check this breaker if the house batteries are not charging.

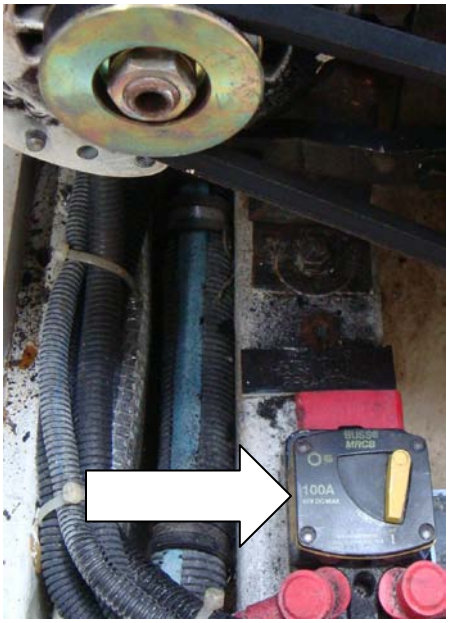


Figure 4-13 100-amp Alternator Breaker

4-3.7.1 CHECKING DRIVE BELT TENSION

The Yanmar engine in the Navy STC has two drive belts. The belt on the port side drives the engine start alternator and the impeller pump. The belt on the starboard side drives the house bank 100 amp alternator. Both are powered by the crankshaft. Checking the belt tension for proper deflection on either alternator is done along the longest unsupported belt length. Drive belts should have no more than 3/8" for a new belt and 3/8 - 1/2-inch of play for an older belt.

4-3.7.2 ADJUSTING THE DRIVE BELTS

Before starting this procedure insure that the following are on hand:

- Appropriate size wrenches.
- Pry bar.
- Replacement drive belts. **Drive Belt sizes may not be substituted.**

1. Shutdown the engine.
2. Loosen the bolt on the adjustable bracket and tension the belt for proper deflection by prying the alternator outward and retighten the securing bolt. Repeat the procedure for the alternator on the opposite side if needed.
3. Start the engine to insure proper function.

4-3.7.3 HOUSE ALTERNATOR DRIVE BELT REPLACEMENT

1. Loosen the adjustment bolt and slide the alternator inboard and remove the defective belt and replace with new belt (unless engine belt needs replacing too).
2. DO NOT replace the house alternator drive belt at this time if the engine start alternator belt must also be replaced. ***The engine drive shaft has a double pulley mounted on it. The drive belt for the house alternator traps the belt for the engine start alternator.***

4-3.7.4 ENGINE ALTERNATOR DRIVE BELT REPLACEMENT

1. Close the sea water intake through hull seacock.
2. Disconnect the raw water pump inlet hose, placing the hose in an upward position to minimize spillage of raw water.
3. Remove the house belt from the pulley to allow access to the engine belt
4. Loosen the engine start alternator to remove the defective belt.
5. Replace the ES drive belt.
6. Now replace the house drive belt.
7. Reconnect water pump inlet hose.

8. Pull/pry the house bank alternator outward to exert tension on the belt.
9. Maintain pressure on the alternator and tighten the lower sliding bracket bolt and the top mounting bracket.
10. Check the belt tension and readjust as necessary.
11. Repeat the procedure for the engine start alternator.
12. Open the sea water intake through hull seacock.

Complete safety checks and start the engine. After the engine is started, check for discharged seawater (**if none is visible, stop the engine immediately**). Observe the engine while running to insure proper operation. Stop the engine after a few minutes of running and recheck tension on both belts.

4-3.8 STARTER

The starter is mounted on the PORT side of the engine. The operator can do very little maintenance. Refer all problems to an experienced service person. **While inspecting the starter insure the engine cannot be started.**

4-4 FURUNO TRACKBALL MAINTENANCE

The Furuno trackball is subject to becoming “sticky” and difficult to move. The approved method of cleaning the trackball is to wipe it with a damp alcohol wipe from the first aid kit.

4-5 TANK TENDER GAUGE OVERFILL CORRECTION PROCEDURE

Occasionally, after filling a tank, the additional head from the fill pipe will force liquid up into the small diameter clear plastic tube attached to the tank, causing an unusually high reading. Should this be the case, pump very slowly to force liquid out of the tube and thus obtain an accurate reading.

NOTE: If a head of fluid exists above the top of the tank (i.e., in the deck fill pipe) the gauge needle will charge up. Should you observe this, release the push button and use enough water or fuel to empty the fill pipe before testing again. **Do not operate with the tank tender with the deck fill pipe full.**

CHAPTER FIVE
EMERGENCIES AND DAMAGE CONTROL

5-1 INTRODUCTION

A ship that goes to sea is traveling into harm's way. While we train how to use our vessel in a safe manner to accomplish the mission and through good, thorough planning achieve success, there will come a time that even though not intended, events will occur that put us in extremis. In an emergency, a good team with sound judgment, logical thinking, determined effort, and a good plan, can minimize problems and prevent total disaster. The procedures contained in this chapter are the result of knowledge gained from situations that have occurred and the methods determined to best deal with them.

5-2 SAFETY EQUIPMENT

The Navy 44 MK II shall comply with U.S. Coast Guard (USCG) and local regulations, in addition to the current *ISAF Offshore Special Regulations Governing Offshore Racing for Monohulls and Multihulls* Category 1 for offshore passages. Check the *Standard Operating Procedures (SOP) for Large Sail Training Craft* (STC) for additional checklist requirements for departure. A summary of the required safety gear is listed in the load-out list kept by the Cutter Shed.

5-3 DAMAGE CONTROL EQUIPMENT

Each NAVY 44 is provided with a Damage Control (DC) Kit and sufficient tools, supplies and equipment for use in emergency situations, primarily flooding. The DC Kit is stowed in the forward port locker in a water resistant orange box. See Table 5-1 Damage Control Kit for contents.

5-4 CREW OVERBOARD (COB)

In the event that a person does become separated from the boat, every effort must be made to get the victim back aboard in the absolute minimum amount of time to prevent hypothermia and shock. **See the SOP Chapter 8** for COB recovery procedures.

5-4.1 RECOVERY PREPARATION

At the beginning of each watch:

- Each crew member shall check all his personal safety equipment including harness/PFD, tether, strobe, whistle and foul weather gear. All gear shall be readily accessible throughout the watch (crew should not have to leave their watch posts to don appropriate safety gear).
- Watch Captain will brief the watch section on the particular details of the crew overboard recovery procedures that will be used, considering current conditions of wind, seas, and sails.
- Watch Captain will check all crew overboard recovery equipment to ensure that they are ready for immediate use.

Crew overboard recovery equipment onboard the MK II includes:

- Lifesling - tied to the boat and equipped with an automatically activated strobe light;
- Heaving line - made of polypropylene line that floats on top of the water and can be used to pull a person closer to the STC, shall be kept within reach of helmsman;
- Horseshoe buoy attached to an automatically activated strobe light and a 6' pole flying the Oscar flag, which should NOT be tied to the boat. This may be a self-inflating Man Overboard Module (MOM) on some racing boats.
- Type I PFD – shall be kept within easy reach of the helmsman while underway, to be thrown to the victim immediately upon hearing the "Man Overboard" call.

5-4.2 SAFETY HARNESSES AND TETHERS

Prevention is the best solution to the crew overboard problem. Each STC should be equipped with a safety harness for each crew member. These are also called "tech vests". Each harness has an integral inflatable life jacket and can be used with a tether to clip onto jacklines (deck safety lines) attached to the STC. In order to be effective, however, they must be worn. They must be fit to the individual. It is strongly recommended to inflate each tech vest overnight using the manual inflation to check for air retention at the beginning of each voyage. CO2 cartridges should be checked for proper insertion (green bar showing, as opposed to red) and spare cartridges and automatic release bobbins carried on board. Safety harnesses should be worn:

- Sunset to sunrise,

- During inclement weather
- At the discretion of the Skipper/Coach

Tethers should be attached to harnesses before exiting the cabin, and clipped into the cockpit before coming on deck. They should be unclipped after entering the cabin.

5-5 DAMAGE CONTROL

The three basic objectives of damage control are PREVENT, CONTAIN, REPAIR. When there is more than one emergency at a time, the crew must also PRIORITIZE and fix the most potentially damaging problem first.

5-5.1 PREVENT

Take practical preliminary measures to prevent damage before danger occurs. Remove fire hazards; maintain damage control equipment in a ready condition for easy access and employment. Train the crew to work as a team. Knowledge of first-aid and damage control is vital.

5-5.2 CONTAIN

Once a mishap has occurred, contain the damage to keep it from getting worse. Minimize and localize damage by controlling flooding, maintaining stability, combating fires and administering first-aid.

5-5.3 REPAIR

Finally when the damage has been contained, repair the boat to achieve as good a situation as possible so as to be able to continue and get the vessel out of harms way.

5-6 HULL DAMAGE AND EMERGENCY REPAIRS

Locate hull leak source:

- Through-hull fittings. See Diagram at the end of Chapter 1-7.8. If the through-hull is damaged, use the tapered, soft wooden plug that is tied nearby to plug the hole. Consider wrapping in oakum first, as that material expands when wet.
- Underwater appendages – check lower rudder bearing, the shaft and strut area, keel bolts.
- Hoses - engine sea water intake hose, and all fresh water system components (Potable water hose, pumps, water tanks, sewage system, etc.). If sailing in salt water, taste the bilge water to see if it's salty or fresh to help determine the source of the leak.
- Hole or cracked hull.

If you determine the hull is damaged, the first action is to stop the flow of water entering the boat.

1. Stop the boat to reduce ram pressure.
2. Heel the boat or tack in order to raise the damaged portion out of the water or as high as possible to reduce the pressure of the water coming in.
3. Consider heaving to.
4. Shutdown engine, turn engine battery selector switch to "OFF" (engine battery is located in the bilge). If ship service batteries under nav seat are in danger of flooding, turn house battery selector switch to "OFF" (if possible, make distress call on ship VHF first, it has longer range than hand held).
5. Close watertight doors and ALL seacocks.
6. Plug any holes in the hull immediately. Small holes may be plugged temporarily by stuffing them with cotton duck, rags or wooden plugs. Larger holes may be temporarily plugged with stuffing material such as life jackets, seat cushions, sleeping bags, sails and wedges. Stuffing material used to plug holes should be sufficiently braced or shored to prevent loosening or slipping away due to motions of the boat at sea.
7. Install a patch outside the hull. Since the pressure of the water is trying to force its way into the boat, it will expel what we try to stuff into the hole. Once the flow of water has been contained and minimized, thought should be given to putting a crash blanket over the hole from the outside. Water pressure will work in favor and try to force the patch into the hole.
8. Get a fix. Contact the Coast Guard with a Pan-Pan or MayDay call at the direction of the OIC/Skipper.
9. If the hull continues to leak faster than the pumps can dewater the boat, prepare to abandon ship.

5-7 ALARMS AND EMERGENCY PROCEDURES

There are several audible alarms on the MK II listed in order of severity. Determine which alarm is sounding and proceed with emergency procedures as listed below:

- HIGH WATER BILGE ALARM. Audible and visual alarms indicates high water in the bilge and a possible flooding problem.
- SEA-FIRE ENGINE FIRE EXTINGUISHER ALARM. This alarm will sound when the inert gas fire extinguisher alarm is activated in the engine box.
- ENGINE HIGH TEMPERATURE ALARM. A high pitched whistle alarm in the cockpit engine panel indicates a possible engine cooling system problem.
- ENGINE LOW OIL PRESSURE ALARM. The same high pitched whistle indicates a possible engine oil starvation problem. When the alarm sounds, immediately check the engine panel in the cockpit to determine if low oil pressure or high engine temperature activated the alarm.

5-7.1 FLOODING and the HIGH WATER BILGE ALARM

The electric bilge pump is located at the top of the keel sump area, on the centerline of the boat, directly beneath the inspection port on the floorboard between the galley and nav station. Bilge water will accumulate in the turn of the leeward section of the bilge (not the sump area) when the boat is heeled over, therefore a regular inspection of the bilge for high water should be conducted and logged as indicated in standing orders. The ALARM will be an indication of severe flooding if the boat has been heeled over. Lift the floor board next to the galley sink and check the water level. The high water float is located on the aft face of the bilge cavity near the top. Water will be up to that level to trigger the alarm.

Turn ON the electric BILGE PUMP on the electrical panel and man the manual bilge pumps in the cabin and cockpit. The pump handle for the cabin is on the forward face of the wet locker bulkhead behind the nav station, between the anti-siphoning loop. The cockpit pump handle is located in the port side line locker.

5-7.2 SEA FIRE ENGINE FIRE EXTINGUISHER ALARM

If the SeaFire Alarm sounds, IMMEDIATELY:

1. SHUTDOWN the engine
2. TURN OFF the engine blower.
3. DO NOT open the engine compartment.
4. STANDBY with hand operated fire extinguishers.

5-7.3 ENGINE HIGH TEMPERATURE ALARM

If the alarm sounds, check the engine panel in the cockpit to determine whether the problem is high engine temperature or low oil pressure. If high temperature is the problem, the most probable causes are loss of sea water cooling, loss of fresh water (coolant) engine cooling or a damaged impeller.

1. Check to see if water is coming out of the exhaust in the transom, if not:
   - Secure the engine by pushing the engine stop button on the engine panel in the cockpit.
   - Check that the raw (sea) water inlet seacock in the port locker behind the engine box is OPEN. Open it if closed and restart the engine, see if water discharges.
2. Inspect the raw water strainer near the raw water intake seacock. If clogged, secure the engine, and close the raw water inlet seacock. Open the strainer, remove the basket, clean and replace it. Open the raw water seacock and restart the engine, see if water discharges.
3. Open engine compartment access. Check for water in the engine bilge. TASTE the WATER.
   - If the water tastes “salty”, a leak in the raw water cooling system is possible. Check the hoses in this system for integrity, and tighten clamps. Restart the engine and see if water discharges over the transom.
4. If there is still no discharge over the transom, the water pump impeller could be defective. See Chapter 4. Replace raw water pump impeller.
5. If the water is NOT salty, a loss of anti freeze/water fluids is possible. Check fluid level in the overflow tank located on the engine compartment. If it is below the “low” level, check that filler caps on the recovery tank and coolant tank were properly closed, check hoses and tighten clamps in this system.

6. If it is necessary to replace coolant in the coolant tank (heat exchanger), place a rag or the "HOT MITT" from the galley over the fresh water filler cap. SLOWLY, crack the filler cap to allow steam to escape. LOOK to see that there is coolant visible in the top of the tank and refill per instructions in the Yanmar manual.
7. If fresh water system integrity check is ok, disassemble and inspect the water pump impeller. If defective, replace impeller. If pieces have broken off the impeller, make sure you retrieve all pieces prior to restarting engine. If you can't locate all pieces, do NOT restart the engine.
8. RESTART engine.

WARNING: ***OPENING THE CAPTIVE COOLANT TANK WHEN THE ENGINE IS HOT CAN RESULT IN SEVERE BURNS TO THE OPERATOR. BEWARE OF HOT ENGINE SURFACES AND OTHER HOT ENGINE LIQUIDS IN THE EVENT OF ENGINE HIGH TEMPERATURE WARNING.***

5-7.4 ENGINE LOW OIL PRESSURE ALARM

1. If the alarm sounds, check oil pressure on the oil pressure gauge on the cockpit engine instrument panel before shutting the engine down. The alarm will sound when the threshold pressure of 15 psi is not achieved.
2. Ensure that oil filler cap is in place.
3. Ensure that oil dip stick is in place.
4. If there is oil in the bilge:
   - CLEAN OIL from bilge.
   - INSPECT for loose hose clamp and/or ruptured hose. Tighten clamp and/or replace hose.
   - INSPECT oil filter for signs of leakage. Tighten if loose.
5. Check oil level. If low, refill, then recheck oil level and continue until dip stick reads "FULL".
6. RESTART engine.

5-7.5 RACOR CONTAMINATION

A visual inspection during engine checks will indicate if there is water or solid material contamination in the fuel at the RACOR filter.
Follow the procedures in Chapter 4 for primary fuel filter/separator cleaning and/or replacement. If water or contamination is found, it is advisable to change the secondary filter. The low pressure side of the engine will need to be bled after opening the fuel system. If bad fuel is suspected, the filters will likely need replacing again. DO NOT use any type of fuel additives unless clearance is obtained from SCRD maintenance or an authorized Yanmar marine dealer.

5-8 FIRE ON BOARD

- Communicate! The person discovering the fire MUST get the word out.
- Act quickly to extinguish the fire before it gets out of control.
- Know all escape routes from the interior; companionway, large hatch in mid-cabin and forward sliding hatch.
- After ensuring all crew are evacuated from the interior, close all openings into the vessel to starve fire of air.
- Beware of toxic fumes that may be emitted from some burning materials, stay low to avoid smoke inside the boat.

5-8.1 FIRE FIGHTING

A general fire fighting plan should be established by the crew for combating fires. Crew members should be assigned to specific tasks so that fire fighting is expedited without confusion.

Fires are divided into different classes depending on the type of combustible material.

CLASS "A" – wood, paper, cloth, etc.
CLASS "B" – combustible liquids, fuels, oils, etc.
CLASS "C" – electrical

CLASS "D" – burning metal (flares)

Fire Extinguisher location, type and size:

- Wet locker bulkhead, port side, aft of navigation station.
  Multipurpose Dry Chemical (ABC) Fire rating 10 Lb
- Aft bulkhead, starboard side, above bunk.
  Multipurpose Dry Chemical (ABC) Fire rating 5 Lb
- Forward main cabin bulkhead, starboard side.
  Multipurpose Dry Chemical (ABC) Fire rating 5 Lb
- Port side cockpit line locker on the forward wall.
  Multipurpose Dry Chemical (ABC) Fire rating 5 Lb
- Engine box interior.
  Inert gas (halotron) system.

5-8.1.1 GALLEY FIRE (Class B)

1. Turn off the propane switch at the galley panel.
2. Shut off gas knob in the propane locker.
3. Shut off burners and oven controls.
4. Extinguish the fire.
5. Account for all the crew.

5-8.1.2 ELECTRICAL FIRE (Class C)

1. Turn “OFF” circuit breaker, engine and house battery selector switches.
2. Put out the fire.
3. Use caution to avoid electrical shock.
4. Once the fire is out, selectively turn on electrical equipment until the faulty circuit is identified. Keep this circuit OFF.
5. Ventilate the boat.
6. Account for all the crew.

WARNING: ***When fighting a Class "C" fire, the power source must be secured immediately, turn battery switches and all breakers OFF.***

5-8.1.3 ENGINE FIRE (Class B and/or C)

When a fire is detected by the sensor on the inert gas fire protection system in the engine compartment, the indicator light located on the electrical switchboard panel will activate, and an audible alarm will sound indicating the gas is being released in the engine compartment to combat the fire.

1. The inert gas system may be activated manually by the handle on the starboard side of the cockpit near the engine panel.
2. **Shutdown the engine immediately** using the stop button on the engine control panel, OR if that does not work, use the T-handle adjacent to that panel.
3. **Turn “OFF” the engine blower immediately** so that the inert gas is not evacuated out of the engine box.
4. Turn “OFF” the engine battery selector switch and the Engine Start breaker.
5. Shut off the fuel at the fuel tank.
6. Get a fire extinguisher ready in case the fire jumps the confines of the engine compartment.
7. Do not open the engine compartment before the fire is completely out and the gas cylinder is completely discharged. This may introduce oxygen to the area and support combustion. Have a portable fire extinguisher ready when the compartment is opened.
8. Evacuate crew not engaged in fighting the fire out of the cabin.

5-8.2 TYPES OF FIRE EXTINGUISHERS

- Water (Type A fires only)
- Baking Soda (Type B fires)
- Tri-Class (Type A,B,C) Multipurpose Dry Chemical

- Carbon Dioxide (Type C fires)
- Inert Gas; Halon or Halotron (Type B,C fires)

5-8.2.1 INERT GAS FIRE EXTINGUISHING SYSTEM

This system is the primary means of extinguishing engine compartment fires. It is mounted in the engine box and has a thermostat that is tripped at 175 degrees F.

5-8.2.2 DRY CHEMICAL FIRE EXTINGUISHER

Use these procedures when using the three (3) dry chemical fire extinguishers.

1. Carry the extinguisher in upright position, and approach the fire as closely as heat permits.
2. Remove the locking pin from the valve.
3. Grasp the handle and aim at the base of the fire.
4. Squeeze the release lever.
5. Direct the discharge at the base of the fire in a sweeping motion.
6. Release the lever to close the valve as soon as conditions permit and continue to open and close it as necessary.
7. When fighting fire in electrical equipment or on a bulkhead, direct the discharge at the bottom of the flame area. Sweep slowly from side to side and follow the flames upward as they recede.

5-9 EMERGENCY STEERING

When the boat fails to respond to the wheel, balance the sails to keep the boat on a steady heading. This will facilitate the procedures to diagnose the problem.

5-9.1 WHEEL DETACHES

If the wheel detaches from the wheel shaft, a key may also fall out. To reinstall the wheel, the key must be found and inserted in the matching keyway on the wheel hub. The retaining nut should be reinserted with Loc-Tite.

5-9.2 WHEEL WILL NOT TURN

Check for foreign object jamming the steering quadrant or cables in the steerage compartment aft of the engine.

5-9.3 BOAT DOES NOT RESPOND TO WHEEL

If the steering cable comes loose from the quadrant, or if the cable breaks, the wheel will spin freely with no apparent effect.

1. Control the boat by balancing the sails or heaving to.
2. Remove the rudder cap and install the emergency tiller.
3. Inspect quadrant and reinstall cable.
4. If cable has broken, continue to sail with the emergency tiller.

5-9.3.1 SETTING UP THE EMERGENCY TILLER

1. Remove cover over the rudder post using a winch handle.
2. Remove the emergency tiller from its stowage position in the port sheet locker and install on the rudder stock so that the tiller is pointed laterally parallel to the wheel.
3. Ensure that the tiller is fully seated on rudder post and that the retaining device is secured.
4. Steer with the emergency tiller. Lines led to winches may be required.

NOTE: *Weigh the merits of releasing/cutting the wire rope leading to the radial drive and removing the wheel. Do this only if the cable is jamming the movement of the rudder or the wheel makes it difficult to steer the STC.*

5-9.4 RUDDER JAM OR LOSS OF RUDDER

1. Control the boat by balancing the sails or heaving to.
2. If the rudder is jammed and cannot be turned, rig an emergency rudder.
3. Use the spinnaker pole as an emergency steering oar.
4. Lash a floor board or a locker door to the end of the spinnaker pole.
5. Attach a safety line to the inboard end of the pole and deploy it out the stern pulpit.

6. Lash the pole so the make shift rudder can reach the water, yet has enough motion to be able to steer.
7. Rig a small drogue with control lines to both ends of a spinnaker pole rigged across the boat. Run control lines to the winches. Pull the drogue from one side to the other to turn, while trimming sails accordingly.

5-10 LOSS OF ALL ELECTRICAL POWER

1. Check the rotary battery switches for the engine and house banks to ensure they have not been inadvertently shut off. If they are off, turn them on.
2. Check the batteries for proper storage, charge, connections, and a proper grounding. Clean terminals as needed, try power again.
3. Cut off power at each individual circuit breaker on the switchboard panel. Selectively, turn on individual circuit breakers until the circuit causing the electrical problem is located. Cut off power to that circuit.

5-11 DISMASTING PROCEDURES

1. Expeditious action will minimize the danger and ensure the safety of the boat and crew.
2. Account for all crew members.
3. Do not turn on the engine. Shrouds, halyards, and sails can foul the prop.
4. Control and lash the broken section of the mast on deck to prevent it from punching a hole in the boat. If the mast cannot be controlled, get rid of the mast by pulling the cotter pins and use the drift pin to pound out the clevis pins, unfasten turnbuckles or cut off the shrouds with a hacksaw.
5. If the mast does not break cleanly, saw or shear off the mast at the stump.
6. Salvage as many sheets, halyards, sails and gear as possible for jury rigging.
7. In moderate seas, the mast can be lashed on deck. Pull all sails on board to prevent them from weighing down the mast. Pull the mast on board and lash it tightly to the lifeline stanchions.
8. Once the mast has been controlled, or cast off, then consider use of the engine after ensuring no lines are run over the side of the boat. Jury rig a mast and sails. Consider using the broken mast section if available and/or use the spinnaker pole. This will conserve fuel supply if safe harbor is a long distance away.

WARNING: ***SHROUDS AND LINES CAN BECOME ENTANGLED ON THE PROPELLER OR RUDDER. IF YOU CONSIDER PUTTING A CREW MEMBER IN THE WATER, SECURE A LINE TO THE CREW MEMBER AND TIE IT TO THE BOAT BEFORE THEY ENTER THE WATER***

5 -12 ABANDON SHIP

Procedures for abandoning ship should be established prior to embarking. The SOP (Standard Operating Procedures) outlines steps to be taken in the event of abandoning ship in Chapter 8, including correct deployment of the life raft, mayday radio transmission and suggested list of items to put into the raft.

CHAPTER 6
SPECIAL OPERATIONS

6-1 INTRODUCTION

The Navy 44 is designed for night operations, heavy weather, restricted visibility, and offshore passages. However, the time to investigate its sailing characteristics is BEFORE these operating conditions are encountered for the first time.

6-2 NIGHT OPERATIONS

Prior to night operations, the crew should familiarize themselves with the DC ELECTRICAL DISTRIBUTION PANEL; the physical location of the switches for RUNNING LIGHTS, navigation lights, tri-color light, compass light, cabin lights, foredeck light, DC outlets, safety gear and flashlight stowage locations.

RUNNING LIGHTS. There are two sets of navigation lights.

- The NAVIGATION LIGHTS set includes the bi-color combination light located on the bow pulpit and the stern light located on the radar post.
    - Select NAVIGATION and STEAMING lights when motoring or motor-sailing.
- The TRICOLOR set is the tri-color light located at the masthead.
    - Select TRICOLOR when sailing.

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NOTE

COLREGS permit either the high or low running lights for night or reduced visibility, but state that both may not be used at the same time.

Figure 6-1 DC Distribution Panel - Center Column

The STEAMING LIGHT on the mast is required by COLREGS to be shown with the NAVIGATION LIGHTS when operating the engine for propulsion.

The ANCHOR LIGHT is located immediately under the TRICOLOR light at the masthead. It is a white light visible through 360 degrees and must be displayed when at anchor.

The FOREDECK LIGHT is the lower of two lights housed in the same unit as the STEAMING LIGHT. It illuminates the deck.

The COMPASS LIGHT is mounted in the binnacle to illuminate the compass.

The SAILING INSTRUMENTS, SSB and VHF RADIOS and NAVNET (radar/GPS/weather fax) switches are on the forward (right hand) column.

6-3 HEAVY WEATHER OPERATIONS

Prudence is required for all heavy weather operations. The urgency of the mission must be considered. If there is no urgency to conduct the sortie, prudence would dictate that the vessel remain in port. Once committed to the sea, the decision to seek the safe haven of a secure port must be weighed against the hazards of making a landfall in adverse weather. Once committed to the sea, employment of these procedures will help to ensure a safe passage for the crew as well as the boat.

6-3.1 STORM SAILS

The Navy 44 is a sailboat and is designed to sail. The stability of the boat under sail, even in heavy weather, is preferred to that of proceeding under engine alone.

General Situation:
Assume high winds and heavy seas.
Safety Considerations:

1. Safety harnesses are required.
2. DO NOT rig the inner forestay without rigging running backstays.
3. There will be enormous forces acting on the rig during conditions when these sails will be rigged.
4. Ensure the tackline of the storm trysail is secured to the padeye on the mast, port side, to prevent the sail from being hoisted off the luff track.
5. Once the mainsail is lowered, ensure positive control of the boom is maintained at all times.
6. Exercise extreme care when transferring the halyard from the mainsail to the trysail.

6-3.1.1 BENDING ON THE STORM JIB

NOTE: ***The spinnaker topping lift, (T-Lift), is used as the halyard for the storm jib to provide the same hoisting angle as the inner forestay.***

1. Rig and tension the inner forestay.
2. Rig one large snatch block between the primary and secondary winches. Rig to both sides of the boat.
3. Hank on the storm jib to the inner forestay and attach the topping lift to the head of the jib. Ensure that jib sheets are attached.
4. Lead the jib sheets outboard of the shrouds if off the wind, through the permanently attached block five holes forward of the closed chock on the toerail, to the primary winches. Lead the sheets the same as a number 3 or 4 jib if attempting to sail to weather. Tie a stopper knot in the tail of the sheet.
5. Rig the running backstays. Lead running backstay tails on the inside of the life lines, through the large snatch blocks, and then to the secondary winches.
6. The storm jib may also be led to the secondary and runner to the primary winches.

6-3.1.2 HOISTING THE STORM JIB

1. Untie restraints used to hold the jib in place prior to hoisting.
2. Hoist the jib using the topping lift.
3. "Take" on the sheet and set to desired trim.

6-3.1.3 BENDING ON THE STORM TRYSAIL

The storm trysail is used in winds of 35+ knots instead of the mainsail.

1. Bring the storm trysail up on deck. Tie the bag down in the vicinity of the mast.
2. Tie the pendant of the tack of the sail to the padeye on the mast below the bottom of the track.

WARNING: ***Care must be taken to control the sail as the cars are loaded onto the storm trysail track to prevent the wind from filling the sail prematurely.***

3. Open the mast track keeper on the dedicated storm trysail track on the port side of the mast.
4. Load the cars for the trysail into the storm trysail track on the port side of the mast.
5. This completes the bend on procedures to this point because;
   - The halyard cannot be attached to the head of the trysail until the mainsail is lowered.
   - The sheets attached to the storm trysail cannot be led to the spreacher blocks in the quarter of the boat until the mainsail is lowered.

6-3.1.4 HOISTING THE STORM TRYSAIL

1. Lower the mainsail, flaking it on the boom.
2. Lash the mainsail to the boom with four sail ties or more.
3. Tension the boom vang (being careful not to over tension).

NOTE: ***The actions of steps 4 and 5 are intended to immobilize the boom in a position that presents the least obstruction.***

4. Use a 4-part block and tackle or run a sail tie from the aft bale on the boom to the toe rail, (downwind side is a consideration). Make the tackle “snug”. This imparts a force vector down and to the rail of the boat.
5. Move the traveler to the same side, and tie off the mainsheet to the base of the winches on port and starboard, taking as much tension as possible. This exerts a force vector down and toward midships.
6. Lead the attached sheets of the STORM TRYSAIL through the spreecher blocks to the mainsheet winches.
7. Remove the halyard from the mainsail taking extreme care not to let go of it. Attach it to head of the trysail and hoist.
8. Trim BOTH sheets to centerline. This will make the STORM TRYSAIL “self tending” when the boat is tacked.

The boat will make way to weather with these sails set enabling the boat to work its way off of a lee shore.

6-4 RESTRICTED VISIBILITY

The caveat advanced for heavy weather sailing applies to operations in reduced visibility. The following procedures must be followed in addition to those employed for sailing in "fair weather".

1. COLREGS require that navigation lights be displayed when visibility is restricted.
2. COLREGS require that fog signals be sounded when the visibility is reduced.
3. Night operations are considered reduced visibility for the purposes of navigation lights.
4. A forward lookout is prudent in the bow for advance warning of ship traffic and obstacles.
5. Prudence must be used to decide whether to operate under engine to generate electrical power for the RADAR or to operate under sail for better hearing of sound signals.
6. Precise navigation is required. Use as many nav aids as possible to ascertain a positive position, GPS, RADAR, hand bearing compass, piloting techniques.
7. Place the VHF radio on scan to include Channel 9 VHF, and Channel 13, Bridge to Bridge, and Channel 16 for emergency radio traffic.
8. Plug-in the spotlight and have it ready in the fog to train in the direction of suspected targets. The intensity of the spotlight will penetrate fog and illuminate obstructions when visibility from the naked eye is limited.

6-5 OPERATIONS OFFSHORE

Long distance passage-making is well within the capability of the NAVY 44. Items that require special considerations are:

1. Safety harnesses must be worn, and the crew member "clipped in" to hard points on the deck of the boat, prior to exiting the cabin at night or at any other time as may be required during rough weather. Crew members should not unclip until they are back down below.
2. Jacklines are rigged from the bow along each side deck inside the shrouds to the aft quarter of the boat. Secure the tether of the harness to a jackline for access forward of the cockpit. Double tethers are recommended to get around the shrouds when working on the foredeck. Clip on with the secondary before unclipping the primary tether.
3. Buddy system procedures are encouraged to account for topside personnel.
4. Awareness of changing weather conditions is imperative for early sail changes. The time to change a sail or to reef is the first time the thought occurs.

6-6 TOWING OPERATIONS

There may come a time when you will need to tow another Navy 44 or to be towed. Determine whether the tow will be astern or alongside. Generally towing astern is more convenient in open ocean. Towing alongside is recommended within the shelter of a harbor when preparing to deliver the towed vessel to a dock. Deck hardware applicable to towing is:

1. Two mooring cleats at the bow, port and starboard.
2. Four closed rail chocks bolted on to the toe rail; two amidships, port and starboard and two at the

stern quarters, port and starboard with corresponding mooring cleats in the stern.
3. Four (4) 45-foot, 5/8-inch diameter, laid nylon line for docking/mooring lines.

6-6.1 TOWING ASTERN

These procedures apply to you as the tow vessel.

WARNING: ***THE TOW BRIDLE MUST BE CLEAR OF ALL STERN COMPONENTS FROM THE CHOCK ON ONE QUARTER OF THE VESSEL TO THE CHOCK ON THE OPPOSITE SIDE.***

1. Communicate with the OTHER vessel and determine who will provide the towing hawser.
2. Rig a bridle that will be long enough to clear the stern components of your boat. Attach a snatch block in the middle of the bridle so the sheave will ride on the bridle.
3. Pass one end of the bridle through the chock on the transom. Tie bridle to a stern cleat. Pass the bridle in through the chock on the other quarter. A loop can be tied into the end with a bowline to simplify engaging and disengaging the bridle. Take care to keep the bridle out of the water while maneuvering with the engine engaged.
4. Maneuver your vessel to pass close aboard.
5. If using the towed vessels hawser, skip to USING THE TOWED VESSELS HAWSER. If using your own hawser continue with this procedure.

USING YOUR HAWSER.

6. Tie the hawser to the snap shackle of the snatch block. Use a bowline.
7. Pass the hawser to the other boat.
8. Go to TAKING THE TOW.

USING THE TOWED VESSELS HAWSER.

9. Take the towed vessel's hawser.
10. Tie the hawser to the snap shackle of the snatch block riding on the bridle. Use a bowline.

TAKING THE TOW.

11. Proceed forward slowly as the hawser is made ready.
12. After you receive a signal, (visual, audible or by VHF radio) that the hawser is ready, slowly take tension on the hawser.
13. Establish a steady strain on the line.
14. Adjust speed through the water for sea conditions and compatibility of the tow line between the vessels.
15. Check lines periodically for chafe.

6-6.2 BEING TOWED ASTERN

1. Ready the foredeck for the hawser. Clear a path from the bow pulpit to the mast. Secure the hawser to a bow mooring cleat, and then tie to the mast with a bowline.

USING YOUR OWN HAWSER.

2. Tie it to the mast, then the cleat, and pass it through either side of the pulpit. Make it ready to pass to the towing vessel when it passes alongside.
3. Pass it to the towing vessel.

USING THE OTHER VESSELS HAWSER.

4. When using the towing vessel's hawser, take it, pass it through the bow pulpit, secure to the cleat and tie it to the mast with a bowline.
5. Place chafing gear in the pulpit if the boat will be towed long distances.
6. Tend the hawser and call out the amount of slack in the line.
7. As the line comes taut, call out the amount of strain.
8. Helm. Steer the boat to align the boat with the towing vessel and keep the boat in trail.

9. Use hand signals and/or VHF radio to communicate the desired boat speed. This is the responsibility of the vessel being towed.
10. Monitor the hawser for security and chafe.

6-6.3 TOWING ALONGSIDE

NOTE: ***A likely scenario for this procedure is that of changing from towing astern in open ocean to towing alongside once the safety of a harbor has been achieved and in preparation for delivering the towed vessel to a dock.***

1. Lines required are bow, stern, forward spring, and aft spring. Fenders are required.
2. Communicate with the towed vessel and determine who will provide the lines and who will provide fenders. It is recommended that the towing vessel provide lines and fenders. This leaves the towed boat with its lines and fenders available for dockage when released from the tow.

WARNING: ***USE FENDERS TO KEEP THE BOATS APART. DO NOT ALLOW HANDS OR FEET INTO THE AREA BETWEEN THE BOATS.***

3. Fenders should be rigged on the side that will be between the boats.
4. Tow vessel reduces power and swings out of line and allows the towed vessel to creep up alongside. Retrieve the ''slack'' towing hawser to keep it from fouling in the prop.
5. Establish a parallel course with the towed vessel.

CAUTION: ***Keep the towed vessel slightly aft of directly alongside to avoid the spreaders "locking horns" in the event the boats rock in close proximity.***

6. Pass lines across to the towed vessel. Use power as necessary to maintain an 'alongside' position with the towed vessel that is slightly aft of directly amidships.
7. Slowly draw in the bow and aft spring line to make the boats converge, drawing lines in as the distance is reduced.
8. Towing vessel should arrive alongside close enough to pass lines, yet far enough to ensure a safe margin. Choppy water could swing masts together and "lock horns" with the spreaders.
9. Pass lines across from one vessel to the other.
10. Take a light strain on the bow line so that the boats will be drawn together as the tow vessel starts to make way.
11. Adjust the length of the bow line to ensure that the spreaders will not "Lock Horns."
12. Adjust spring lines and the stern line to keep the vessels snug.
13. Signal to the towing vessel when ready to be towed.
14. Helm should be amidships. Let the towing vessel maneuver both vessels.
15. For close maneuvering, be prepared to use the helm in response to any request from the towing vessel.
16. Communicate with the towing vessel as to speed compatibility with your vessel. This is the responsibility of the vessel being towed.
17. Ready lines and fenders for docking when appropriate.

6-6.4 BEING TOWED ALONGSIDE

1. Use the same procedures as in 6-6.3. Use the towing vessels lines and fenders to secure the two boats together. This will leave your lines available for docking when tow is cast off.
2. Steer your vessel to follow the tow vessel in trail.
3. Communicate with the tow vessel the desirability of the towing speed. This is your responsibility.
4. Ready your docking lines and fenders to the free side of your vessel in preparation for being cast off and making a dock.

6-7 ANCHORING

The Navy 44 rides comfortably at anchor. It responds more to wind direction than to current. The following rules of thumb for the scope to be used apply. Use more scope if anchor drags or in rough weather.

- Lunch Hook (short term) – personnel onboard. Length of anchor rode = 3X (water depth at high tide plus height of bow above the water).
- Overnight - personnel onboard. Length of anchor rode = 5X (water depth at high tide plus height of bow above the water).
- Unattended - all personnel ashore. Length of anchor rode = 7X (water depth at high tide plus height of bow above the water).

There are two (2) anchors on board the Navy 44.

- A 20-pound Hi-Tensile Danforth anchor is stowed in the bottom of the port cockpit line locker, with 6 feet of 3/8 inch chain and 250' of ½" rode. It is secured in chocks. This is the anchor most often used.
- A 35-pound Hi-Tensile Danforth anchor is stowed in the forward cabin, on the forward bulkhead, with 6 feet of 3/8 inch chain and 250' of 5/8" rode. It is secured in chocks. This is the heaviest and most secure anchor.

There is a removable anchor roller that is attached to a stainless steel bracket welded into the port bow that functions as a fairlead for the anchor rode. There is a retaining pin that keeps the rode in place once the anchor is set.

6-7.1 PREPARATION

1. Prior to arrival, the navigator determines the approximate depth of the water in the intended anchorage.
2. Bring the anchor to be used to the foredeck.
3. Install the anchor roller.
4. Unlash the anchor rode to be used and take it to the foredeck.
5. Ensure that the rode is attached to the anchor.
6. Ensure that the shackle is "moused" or secured shut with seizing wire or electrical tie.
7. Make the bitter end of the rode fast to the boat (a bowline around the mast works).
8. Select the side of the foredeck opposite to that side used to bring the jib down.
9. Lay out the rode from the anchor on the deck to the shrouds and back in switchbacks until the desired length of rode is acquired (the "J" measurement, 18.5', can be used to estimate rode length).

6-7.2 AT THE ANCHORAGE

1. Visualize where the boat will be in the anchorage. Estimate a distance to windward equal to the amount of anchor rode to be used. This is where the anchor should be dropped.
2. Ensure there is sufficient room to clear other boats in the anchorage if the wind shifts.
3. Approach the anchor drop zone into the wind under engine.
4. As the boat approaches the drop point, put the engine in neutral.
5. Feed the anchor and rode out through the pulpit on the same side as it has been cleated until the anchor is AT THE WATER.
6. When way has been lost, lower the anchor hand over hand until it touches bottom. Dropping the anchor with no control may foul it on its own chain or rode.
7. Pay out rode and note approximately how much it took to reach the bottom. Compare this to the depth the navigator predicted so as to determine the accuracy of the amount of scope being used.
8. Put the engine in reverse, using small bursts in reverse until the anchor is set.
9. Take a "round of LOP's" to fix position on the chart. GPS position can also be used.

6-7.3 AT ANCHOR

1. Navigator can set the GPS anchor alarm for a swing circle plus an acceptable wander distance.
2. Check the boat's position according to boat routine as established by the skipper. Set an anchor watch if advisable.
3. It may be necessary to re-set the anchor if it drags or pulls due to a shift in current or weather.

6-7.4 DEPARTING FROM THE ANCHORAGE

The preferred method is to have two crew on the bow. One to take in on the rode as it comes slack, the other to "spot" the anchor and relay signals to the helm. Foredeck personnel should be prepared to deal with a mud covered anchor. Keep the anchor and rode to the side opposite where the jib is being readied to hoist.

1. Start the engine.
2. Place the engine in forward and work the boat up to the anchor following the signals of the spotter.
3. Uncleat the anchor rode and hold it at the ready snubbed on the cleat to provide holding friction.
4. Take in on the rode as it becomes slack.
5. When the boat is over the anchor and all slack is taken out, cleat the rode.
6. Take the boat out of gear and let the momentum of the boat ride over the anchor.
7. Feel the "slack" as the anchor is dislodged. Take in on the anchor rapidly to avoid it setting itself again. When off the bottom, report "Anchors Aweigh" to the helm.
8. Helm can put the boat in gear and with slow speed leave the anchorage.
9. As the anchor is brought up report, "In sight", and whether it is 'clear or foul'. Hold the anchor at the waterline.
10. Inspect the anchor for debris. If it has mud etc. clinging to the anchor, hold the anchor in the water and let the wave action "wash" the anchor, being careful not to let the anchor scratch the hull.
11. When it is clean bring it up on deck. Report "anchor on deck".
12. Return anchor and rode to their stowed location.

6-8 MOORING

The diagram below shows positions for mooring lines at a dock. The bow and stern lines keep the boat next to the dock, the forward and aft spring lines keep it from surging forward or aft. Breast lines are optional, and typically used to keep the vessel from moving away from the pier, or can be used to pull it close to the pier for boarding. Breast lines can be used at the bow, stern or quarter. Use fenders to protect the topsides from chafe. NEVER put hands or feet between the dock or pilings and the boat, use a fender instead.

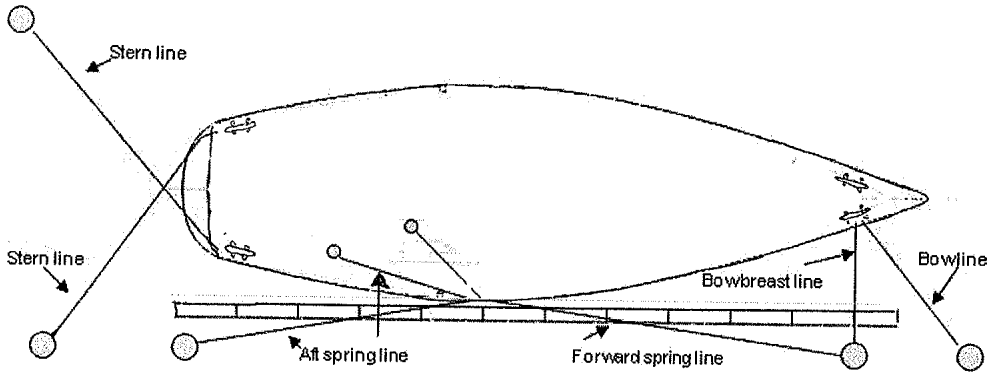

Figure 6-2 Dock Mooring Line Positions

6-9 GALERIDER DROGUE

The Galerider drogue is designed to be trailed off the stern of the boat, with the intention of allowing the stern to the wind in heavy seas and high winds. It will slow the boat down and help prevent pitchpoling, extreme yawing or broaching. The objective in deploying your Galerider is to set it in the second sea following your vessel with enough -- but not too much -- stretch in the tow line. This could require 300-600' of line depending on the conditions. It should be secured to the boat using a bridle attached through the closed chocks and tied off to the aft mooring line cleats.